REPORT RESUMES

ED 012 804 24 AA 000 164

SELECTED PSYCHOLOGICAL CONCEPTS AS APPLIED TO THE TEACHING OF DRAWING.

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REPORT NUMBER BR-5-1361 PUB DATE DEC 66
CONTRACT OEC-6-10-159
EDRS PRICE MF-$1.00 HC-$8.20 205P.

DESCRIPTORS- *ART EXPRESSION, PSYCHOLOGICAL CHARACTERISTICS, *FEEDBACK, *THOUGHT PROCESSES, *CREATIVE THINKING, *LEARNING THEORIES, *PSYCHOLOGICAL PATTERNS,

TWO CLOSELY RELATED ART LEARNING EXPERIMENTS WERE CONDUCTED IN A SETTING WHERE COLLEGE UNDERGRADUATES, TRAINED AND UNTRAINED IN ART, MADE SEQUENTIAL DRAWINGS OVER A 6- AND 7-WEEK PERIOD UNDER RELATIVELY CONSTANT CONDITIONS, EXCEPT FOR THE INTRODUCTION OF CONTROLLED TREATMENT INFLUENCES. THE SECOND EXPERIMENT WAS BUILT, IN PART, ON THE OUTCOMES OF THE FIRST. SUBJECTS WORKED IN A LABORATORY STUDIO. THEY WORKED ONE AT A TIME, FOR HOURLY PERIODS. UNDER STIPULATED CONDITIONS, AN ASSEMBLAGE-LIKE, MANY SIDED STILL-LIFE WAS USED AS A DRAWING STIMULUS. WHEN THE STILL-LIFE WAS NOT USED, THE SUBJECT WAS SURROUNDED BY WHITE WALLS, FREE OF DECORATION. IN EACH EXPERIMENT TIME-LAPSE PHOTOGRAPHS OF DRAWING PROCESSES WERE USED AS FEEDBACK TO THE LEARNER. IN THESE EXPERIMENTS, TWO ART STRATEGIES, OR THOUGHT PROCESSES USED IN DECISION-MAKING, WERE STUDIED AS A BASIS FOR THE SELECTION OF TERMS FROM PSYCHOLOGICAL LEARNING THEORY TO BE USED ON A HIGH LEVEL OF ABSTRACTION FOR THEORY BUILDING ON LEARNING IN ART. THE TWO STRATEGIES USED WERE TERMED "SPONTANEOUS" AND "DIVERGENT." RESULTS OF THE STUDY PERMITTED IDENTIFICATION OF SIX FACTORS, THREE IN EACH STRATEGY WITH SEEMINGLY ACCEPTABLE LOGIC. THESE FACTORS, "PROCESS DIALOGUE," "SPATIAL CONTINUITY" AND "BIG CENTRAL ATTACK" FOR THE SPONTANEOUS STRATEGY AND "CONTROLLED DETAIL," "ELABORATION AND PATTERN," AND "SEGMENTED FORM AND SPACE" FOR THE DIVERGENT, WERE HIGHLY INTERCORRELATED, AND THE AUTHOR CONCLUDED THE STRATEGIES SHOULD NOT BE REGARDED AS BIPOLAR. FINDINGS IN RELATION TO THE CHARACTERISTICS AND PERFORMANCES OF THE STUDENTS ARE ALSO INCLUDED IN THE REPORT ALONG WITH A DISCUSSION OF IMPLICATIONS AND RECOMMENDATIONS. (AL)

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BR-5-1361
PA 24

ED012804

FINAL REPORT
Project No. 3149
Contract No. OE-6-10-159

SELECTED PSYCHOLOGICAL CONCEPTS AS APPLIED TO THE TEACHING OF DRAWING

December 1966

U. S. DEPARTMENT OF
HEALTH, EDUCATION, AND WELFARE

Office of Education
Bureau of Research

AA000164

SELECTED PSYCHOLOGICAL CONCEPTS AS APPLIED TO THE TEACHING OF DRAWING

Project No. 3149
Contract No. OE-6-10-159

Kenneth R. Beittel

December 1966

The research reported herein was performed pursuant to a contract with the Office of Education, U. S. Department of Health, Education, and Welfare. Contractors undertaking such projects under Government sponsorship are encouraged to express freely their professional judgment in the conduct of the project. Points of view or opinions stated do not, therefore, necessarily represent official Office of Education position or policy.

The Pennsylvania State University

University Park, Pennsylvania

Acknowledgments

Gratitude is expressed to the U. S. Office of Education for supporting this research as a continuing effort toward understanding the nature of learning in art.

The administration of the College of Education of The Pennsylvania State University in the persons of Abram W. VanderMeer, Dean; Harold E. Mitzel, Assistant Dean for Research; and Edward L. Mattil, Head of the Department of Art Education -- provided encouragement, facilities and equipment without which this study would not have been possible.

Larry Kantner and James J. Johnson, Jr., as graduate research assistants during Fall, Winter, and Spring Terms of 1965-66, not only served faithfully while the two experiments of this report were being conducted, but they also added immeasurably to its theoretical and operational aspects. In addition, they participated in the long and tedious judgment procedures which followed Experiment I.

During the Summer Term of 1966, John Mahlmann and Daniel Kuruna served well as graduate research assistants and in that capacity helped with the judgment and analysis of drawings from Experiment II.

Helen Dunkel, as secretary for this project, was invaluable in her ability to help organize details of planning and production for the two experiments, the subsequent judgments and analyses, and this final report.

Finally, the students who served as subjects in the two experiments deserve mention for their cooperation and enthusiasm, as well as for the insights they shared with the researchers.

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Chapter I

Introduction

I. Background of the Study

This report describes two closely related art learning experiments in a sequential drawing context. Although the design and environment are similar in both cases, the independent variables differ; and the second experiment is built upon the first, even as the first was based on a prior series of experiments (Beittel, 6). In this study, the two experiments are conducted with college undergraduates, both trained and untrained in art. In each experiment time-lapse photographs of drawing processes are used as feedback to the learner. Subjects worked singly, for one hour periods, weekly, over a six week span of time.

An attempt has been made to apply selected concepts from psychological learning theory to learning and instruction in art. A conscious effort to cross-fertilize disciplines partly motivated this inquiry, although, admittedly, the psychological concepts selected may have been greatly vitiated in the way they were applied. There may also be legitimate argument about definitions the selected concepts are given for purposes of this report. It is readily acknowledged that the translation across discipline boundaries was not meant to be literal.

In the broad sense, the present two experiments further question, test and extend the base laid in earlier research describing art strategies and self-reflective learning in art. A description of this research and literature related to it and this report follows.

II. Related Studies

Art Strategy and Art Style

In 1962, Burkhart wrote a book (12) which described "spontaneous" and "deliberate" ways or styles of working he discovered in the art of adolescents and adults, and the associations he found between these ways of working and aspects of creative personality. Later, Burkhart and the author refined these distinctions through the study of time-lapse photographs of drawing processes (Beittel and Burkhart, 8). The term "deliberate" was dropped, since it did not fit the drawing operations newly observed. In its place, the term "divergent" was used, to indicate that, at its best, as with the "spontaneous" style, open and creative behavior were involved -- in short, a "strategy" for thinking artistically.

A brief digression on terminology seems indicated. While the term "style" enjoys long and honorific usage in the history of art, its usage, like that of "form," is so broad as to render it vague in logical discourse, whatever its merits in other contexts. In addition, "style" has received little usage in psychology. "Strategy," on the other hand, while currently overused, does nevertheless evoke the image of actual behavior and thought processes, of what is on-going. In addition, and in common with style, strategy suggests "regularities in decision-making" of an identifiable nature (Bruner, et al., 10); but perhaps unlike style, strategy underscores process identification over product identification of defining attributes. In fact, as in the study of "directed thinking," (Berlyne, 9), the study of strategies inclines one towards the description of operations, transformations, or behavior chains leading toward some clearly or dimly perceived end, problem solution, or product. In its most advanced form, the study of strategies would eventuate in a theoretical model of how certain behavior regularities indeed operate, or in the simulation of behavior, as in the problem solving heuristics structured for computer operation (Newell, Shaw, and Simon, 28, 29).

In this context, no detailed analysis of style and strategy will be attempted, apart from that carried out later in the study itself. The psychological conceptual correlates of the author's position in the literature are fairly numerous (references 9, 10, 26, 28, 29, 31).

Art Strategies as Defined before This Study

Returning to art strategies, these may be simply defined as reliably identifiable consistencies in the processes by which a subject makes his art works. The two strategies with which this study is concerned have been designated as spontaneous and divergent (references 6, 7, 8), and are briefly defined as follows:

> The Spontaneous Strategy, in broad terms, exhibits a beginning big organic statement devoid of detail but suggestive of a whole picture. Through progressive medium interaction, centralization, movement, incorporation of process-inspired accidents, and suggestion, students using the spontaneous strategy focus on the whole problem as they feel it and try to solve it through procedural experimentation.
>
> In the Divergent Strategy, the student typically begins by drawing with considered fine line control a single element which in some portion shows the early inclusion of relatively precise detail. As new elements are added, an alteration of viewpoint and shifting of focus is likely to occur, and the work is off-center and tensional. Through line, black-white contrasts and positive-negative figure-ground reversals, the work undergoes unexpected changes, and becomes flatter and often simpler. (6, p. 7)

Figures 1 and 2, pages 3 and 4, show clear examples of time-lapse sequences of a drawing in the spontaneous and divergent strategies respectively, as these have occurred in this study.

These art strategies are equivalent to Newell, Shaw and Simon's computer simulations of problem-solving heuristics, which they label the "planning" and "means-ends" heuristics respectively (28).

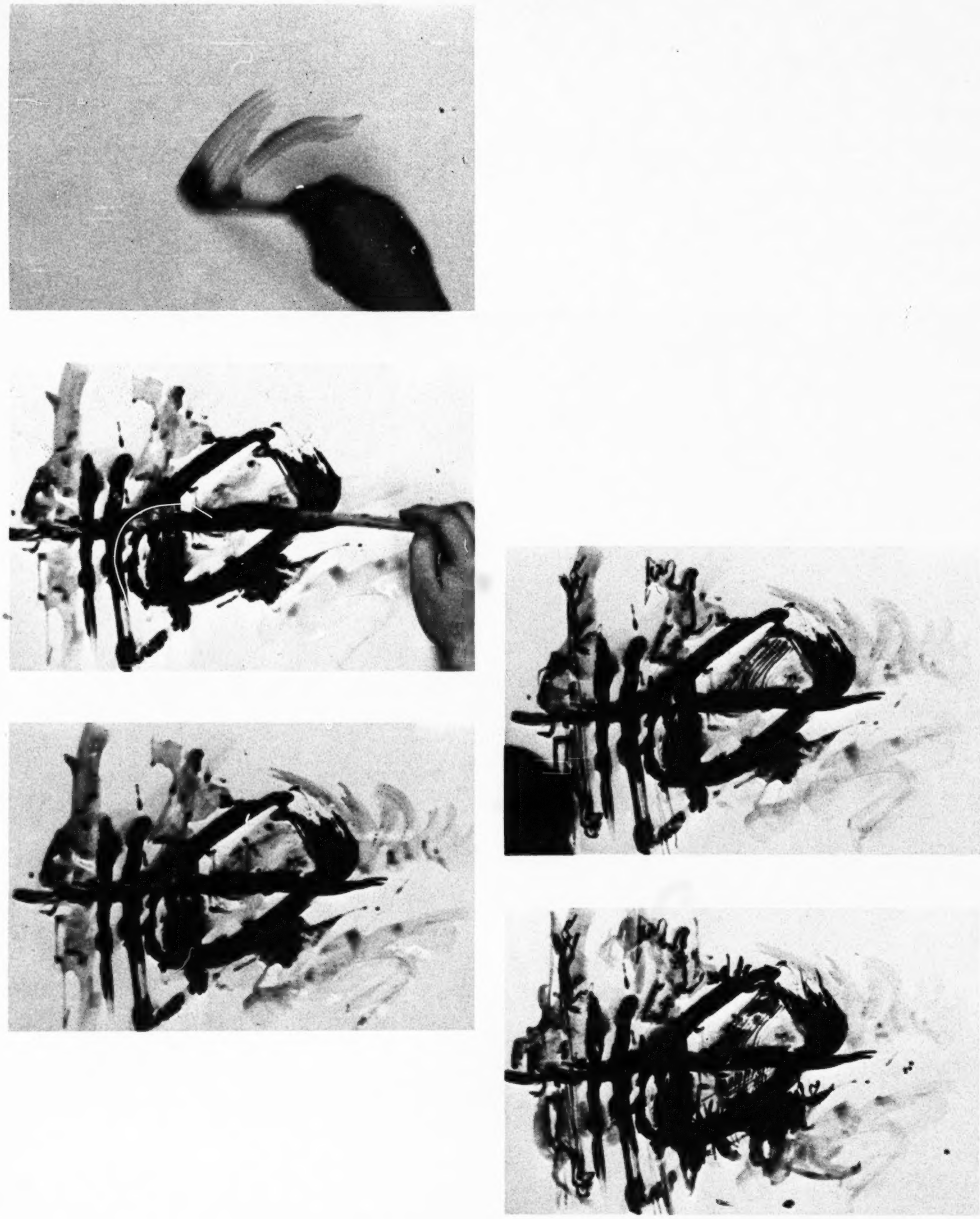


Figure 1: Sequential Time-Lapse Process Photos of a Drawing in the Spontaneous Strategy

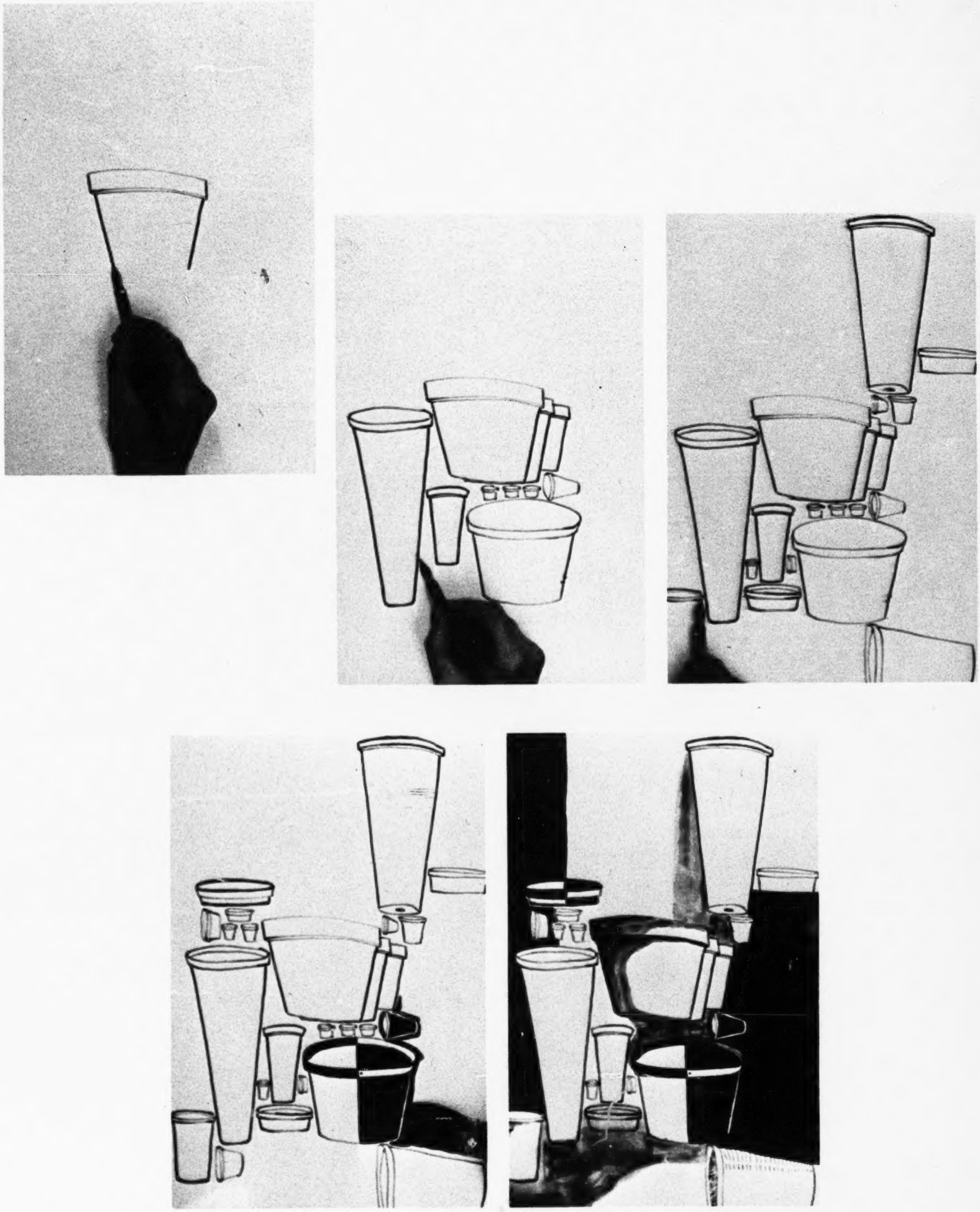


Figure 2: Sequential Time-Lapse Process Photos of a Drawing in the Divergent Strategy

Style as Related to Personality

Acknowledgment of coherent styles of opposed nature, usually seen as recurring in cyclical order, is common in writing on art. Terminology differs greatly, as does opinion on how much the artist's personality and even fate are intertwined with the defined style. Huyghe (18), for example, speaks of "vitalists" and "formalists," stressing that quality is equal in the works of each, but indicating that a "fated inner determinism" is at work in determining which style an artist may use. Itten (19), in like fashion, may be cited as believing in the "rightness" of certain temperament-form-style connections, perhaps in a manner related to the long-standing European traditions for interpretation in graphology (33).

By admixtures of art history, aesthetics, and psychology, Read (32) connects coherent art styles with stable personality traits, largely based on the theories of Jung. Lowenfeld (24), goes much further into detailed artistic and psychological analysis of visual and non-visual sources of drawing, painting, and sculpture as seen in the art of the blind and weak-sighted.

The extent to which styles may be based on long-standing personality traits finds divided support in the literature of art education and the psychology of art. By and large, the artist's inheritance from the romanticism of the nineteenth century inclines him to react much as Huyghe did in the description previously. In the present century, this view persists even in the face of the most severe stylistic dynamism in the history of art.

To be sure, some writers find style-temperament connections even in the art of the young child. Minkowska is quoted as describing the early appearance of "separation" and "joining or connection," leading respectively to "immobility and precision" and to "movement and impreciseness of form" in the art of the child (18). That some credence may be placed in such generalizations is supported by studies outside of art, such as in Kagan's recent study of the "conceptual tempo" to be found in "impulsive and reflective" children (20). Nevertheless, and despite earlier studies by the author and his associates (8, 12), the connection between art styles or strategies and personality and development is far from clear. Earlier studies of expressive movement, such as the classic of Allport and Vernon (4), suggest that "integration" of style and personality can and does occur, but that it is by no means the common occurrence. (As an aside, it is likely, as earlier work by Burkhart and the author shows, 12, 8, that the more "spontaneous" styles - the non-visual, the baroque, sensational, dionysian, etc. -- correlate better with personality variables than their counterparts).

Style as It Appears in the Literature of Art History and Aesthetics

Gombrich (15) accuses the German art historians of working with contrasting pairs of concepts, a method which he feels "...tends to introduce a false dichotomy." He states that all of the contrasting pairs could probably be labelled as "conceptual" and "less conceptual." While one must agree with Gombrich that terms like classical and romantic have been unduly hypostatized in the run of writing on art, nevertheless the "conceptual" and "less conceptual" approaches have continued to appear, cross-fertilize and interact throughout the history of man. Assuredly, a simple cyclical theory of art history based on a biological, or living organism metaphor no longer suffices. As Schapiro has pointed out in his classic essay, "Style" (35), the term is too complex and multi-ordinal to be pinned down in any such arbitrary fashion. The history of art and the history of style can perhaps best be approached by the application of terms and methods borrowed from evolutionary theory, according to the convincing arguments of Ackerman (1, 2).

Still, the author has been both amazed and humbled that the descriptive terms describing art strategies which he and Burkhart developed in a prior study (6, 8) are in spirit and substance often identical with those which Wolfflin first invented to distinguish between classical and baroque art (37). His terms describing line quality (painterly-linear), space (recession-plane), composition (open-closed), elaboration (unity-multiplicity), and light (unclearness-clearness) are directly translatable into clusters of strategy signs describing spontaneous and divergent working processes, respectively.

Ackerman convincingly shows (1, p. 165) that "...our image of style is not discovered but created by abstracting certain features from works of art," and that it is largely irrelevant to define style in the abstract, but extremely useful to ask "What definition of style provides the most useful structure for the history of art?" (1, p. 165) In the context of the present studies, however, the definition of strategy must be chosen which provides the most useful structure for the study of learning and change in art.

Rothschild has written a recent work (34) attempting to summarize and codify the literature on style in art. His key terms are "sensational" and "analytical;" and these are more or less counterparts of spontaneous and divergent. Unlike the author's present position, however, Rothschild makes much of personality traits and pervasive life styles which to him are essentially correlates, or even causative agents, of these styles. It might be fair to state that whereas Rothschild emphasizes the explantory power of his stylistic categories, the present studies focus on conditions affecting styles or strategies, a point of view which pays attention to the open or changing nature of styles. As with Wolfflin, Rothschild's "Table of the Polar Categories" (34, p. 53) includes categories directly translatable into clusters of strategy criteria used in this report.

Notwithstanding these parallel concepts, style in contemporary writing on art refers to meanings much broader and more complex than the term strategy employed herein. Kuhns (22, p. 47) says that style:

> ...forces a selection of artistic methods and subject matter which makes us aware of a partiality. Everything is left out except what the style admits; yet everything omitted is relevant to the experience by a kind of artistic negation.

And Lippman (23, p. 332) thus defines the inner workings of style:

> The style of a composition is a gestalt that reflects the environmental pattern of stylistic forces, and each force defines a stylistic type. Thus the style of the work contains the styles of the period, locality, composer, genre, and medium. But it includes mixtures of another kind also, for each of these larger styles is itself a composition. The period style is a combination of past and present, the regional style a composition of different nations and localities, the personal style a compound enriched by the influence of other composers living and dead, the genre style a mixture containing features of other genres,

> the medium style often in part a parody of a style proper to a different medium, and the stylistic novelty of the work itself a conception not uninfluenced by other individual compositions.

These quotations ably indicate the complexity of the term "style" as it occurs in art history and aesthetics. In contrast to these complexities, art strategy in the present context refers largely to formal aspects of the work of art and to handling of the medium as these unfold in the process of the creation of the work. It is not implied that the artist is or should be aware or conscious of his own "regularities of decision making" as he goes about his drawing, but rather that these processes constitute a valuable focus for the researcher, who can observe how they react to conditions in the environment and describe these with largely neutral language.

Possible Formal, Repetitive and Developmental Bases for Change in Art

Claude Monet once observed that young artists should:

> ... paint as they can, as long as they can, without being afraid of painting badly. If their painting doesn't improve by itself, it means that nothing can be done--and I wouldn't do anything.

In this jointly simple and profound observation is hidden the belief that change and improvement in art comes from immersion in the doing of art itself, when all is said and done. That this assertion is believable is demonstrated by a series of what appear to be unrelated studies. Morris (27) showed how form and approach was varied from one work to the next in the paintings of the great apes. Kellogg (21) collected thousands of "pre-pictorial" drawings of young children and showed the orderly elaboration and development of abstract form units, from scribbles to diagrams to combines to aggregates and, finally, to their use in "pictorials." In like manner, Alexander (3), in speaking of the source of creative power in the young child, makes no reference to mystical properties, but elaborates upon "constraints which are implicit in the act of drawing." In particular, the "schemata" of a drawing exist before the drawing is begun and set many of these "constraints." But it is in his reference to the dynamics within the process of moving from drawing to drawing that cause for change is to be found. These Alexander terms (3) the repetition or reproduction of "previously established motor acts," with consequent modification from both "random variation" during execution and also from "a highly systematic built-in process of levelling and sharpening."

The author has dealt with this literature having bearing on changes occurring across drawings in much greater detail in a paper written during the beginning period of this research (7), from which this brief summary is drawn:

> In recapitulation, Kellogg gives us the clearest description and taxonomy of pre-pictorial graphic development and differentiation, specifying its interdrawing or sequential drawing base. Alexander gives us the broadest explanation of forces bringing about such progressive differentiation and organization while Morris gives us the most far-reaching principles of picture-making as content

within Alexander's scant repertoire, replacing, for example, "levelling and sharpening" by "compositional control, calligraphic differentiation, thematic variation, and optimum heterogeneity."

It would, however, be a false emphasis to suggest that change across drawings has behind it only repetition, formal elaboration, and the like, or that it occurs in a cultural vacuum. The traditions and images from past and present art must have strong impact on the adult who is doing a drawing. Indeed Cezanne and other artists, and theorists like Gombrich (14, 15), have insisted that art has always owed more to other art than to nature. In addition, while this section emphasizes formal-repetitive-developmental sources of change, what might be termed the "semantic," or "meaning" or "content," aspect of art must be acknowledged as prepotent in change in art; for even when the artist is said to be "stuck" with the "schemata" in his cupboard, what Peckham calls "extra-artistic forces at the cultural apex" (31) direct or prejudice the artist's valuation of how he shall manipulate his schemata, what experiments he shall retain, and the like. This semantic aspect of art will receive little attention in this study, since the focus is on change in strategy and aesthetic quality related to systematic manipulation of conditions surrounding the sequential drawing context.

It should also be stated that the search for rational causes for change should not be allowed to deceive us into concluding that the processes which we thus isolate are applied in a rational manner by the artist. And while we may agree with Alexander (3) that drawing has its inner "constraints," we are also forced to conclude that what is termed "free drawing" has in it sufficient openness that it is only with difficulty that it could be classed as even "problem-solving." A "transformational chain" (9) is put into action, but its course is rarely set fully in an a priori manner; so that, in the least, the artist is easily convinced that he is engaged in a "creative process" -- an inductive affair of branching tendencies. Ehrenzweig (13) has recently written along this line of creative thought, in general, as a gradual advance in successive stages, each opening into new clarity; moving then to subsequent stages, and finally to integration through combinations made in progress. Again, without becoming mystical, a self-activated and formally-activated process would appear to be jointly involved, with curiousity, play, and symbolic intent complementing the form variations and dynamics described in brief above.

Self-Reflective Learning Experiments in Drawing

In earlier research by the author and Burkhart (6) certain simple assumptions were seen to underly the constructed model of the "structure of practice" which is seen in the artist's typical picture-making. These were given as:

1. Drawing is a "dialogue" between artist and drawing
2. As such, it is essentially a private affair
3. Reformulation, self-correction, and self direction are facilitated by minimizing change in:
    a. medium
    b. theme or stimulus
    c. procedure for self-evaluation
    d. general working environment

> 4. A "value neutral field" surrounding the picture maker, removing extrinsic rewards, emphasizes the "principle of self-rewarding activation" Morris (27) finds basic to picture-making.

Since the present study continues, or at least was begun, under these assumptions, they have been restated.

The findings from this previous research (6) should also be presented here, since the experiments in this report were originally grounded upon them. A recent summary of these findings (7) is given below, dwelling on the apparent superiority of certain conditions for learning and change in art:

> 1. The strong facilitative effect of what was called "process feedback. "Operationally, process feedback means giving the subject regularly sampled photographs of stages in the development of his prior drawing before he undertakes his next drawings - this is the most potent condition that was uncovered. It bespeaks the importance previously ascribed to the drawing activity itself. It might be expressed thus: nothing seems to improve drawing like drawing and paying attention to how one draws.
>
> 2. The merit of what Rogers calls an "internal locus of evaluation." In operational terms this meant that the subject "discovered for himself" what criteria he should use to evaluate his drawings.
>
> 3. The feasibility of carrying out the evaluation of one's drawings by a program (written instructions), this appearing to work as well as through mediation by another person (teacher surrogate).
>
> 4. The likelihood that the teacher surrogate or mediator and the internal locus or self-evaluative setting instills in the picture-maker perceptions of himself as more creative, confident, independent, and worthy.

These assumptions and findings constituted the general theoretical and empirical background of the experiments in this report. There were, however, several important new ingredients in the point of view of these new studies. To begin with, as the title indicates, an attempt was made to effect a rapprochement with concepts utilized in psychological learning theory. Immersion in the literature of learning theory did, in fact, suggest to the author many possible analogies. These were developed in some detail in a paper by the author entitled "Sketches toward a Psychology of Learning in Art" (7). Space will not allow reproduction of all of this material here.

In general, the review of psychological research and writing on learning did not offer more than suggestive analogies for constructing a theory of learning in art. This is why the words "sketches toward a theory" and not just "a theory" were used. It seemed, in effect, premature to do extensive borrowing of terms from learning theory.

This feeling also led to the decision to concentrate on a more "naturalistic" learning experiment first in the planned two experiment series of this report. By "naturalistic" is meant that direct instruction and influence were to be kept at a minimum and that the effect of having subjects work on sequential drawings would be studied primarily, with process feedback and self-evaluation present in the drawing series as in prior studies. Nevertheless, there was an attempt to define and apply psychological concepts, with somewhat limited definitions specific to the sequential drawing context.

Terms from Learning Theory and Their Definitions

Again, derivation of the selected terms was treated in the author's paper (7) developed parallel to this research; and therefore only the terms themselves and restrictions in meaning placed upon them will be presented here. Four key concepts are involved:

1. Context or task environment. Here the key term is learning set, of which two varieties are identified. Implicit learning set will be taken to mean that set toward what is to be learned which is not mediated through verbal instruction. In terms of experimentation, however, it is assumed that the source, in at least a general way, of even an implicit learning set is controlled, either by some environmental condition which is assumed to bring it about (as in the case of the still-life stimulus of this study, which is contrasted to a mental stimulus for drawing) or else by prior knowledge of characteristics of the learner assumed to predispose him toward a certain implicit learning set. In this latter case, a classification of the subjects according to this prior condition would be necessary in an experiment on learning. Induced learning set is arbitrarily limited to overt, primarily verbal instructions concerning what is to be learned, how it is to be approached, etc. Verbal plus pictorial material might typically be employed, as they were in the second experiment of this report. The chief ingredient of the induced learning set is that the learner is left with little doubt about the structure of the learning task (or, more truthfully, the approach, over-all objective, plus some of its sub-parts are given prior to participation in the task). It will be noted that these definitions are not logically tight, but it is believed that they do allow classifications to occur within the task environment or learning context. Both kinds of learning sets already exist in art instruction.

2. Feedbacks. Process feedback and learning feedback are two arbitrary distinction made under this general term. Process feedback means "displaying to the subject at a specified time after his drawing performance and under stipulated conditions some defined sample of that performance" (7). In this report, process feedback is made up of still photographs of the drawing taken at designated time intervals without interrupting the subject. In distinction to process feedback, learning feedback refers to information, usually verbal, concerning the status of a drawing, where that information is related directly to an induced learning set. Because of the nature of the drawing task, the information involved in learning feedback could be construed as always present in the form of internal evaluation when there is an induced learning set, but in experimentation it is likely to be information from an external source or an experimental procedure to insure that inner mediation takes place.

3. Evaluation refers to the learner's response, usually overt in an experiment, to one or both forms of feedback. While typically verbal, it would not have to be (it could easily be verbal instructions to perform in some way with given pictorial material, or even to produce it, in relation to the feedback).

4. Transfer as a term is taken to include a broad test of the power and retention of learning or of some treatment effect in a slightly or greatly changed task environment. Though the term is quite ambiguous in relation to learning and change in sequential drawings, its inclusion has the positive merit of forcing the experimenter to look beyond continuous treatment effects toward their cessation or toward other controlled conditions. In this way, any change noticed as the result of treatment is already positioned within a larger context, in which it may persist, vanish, reverse its direction, etc. Theory thus generated is given more perspective.

III. Objectives of the Two Experiments

The Open Nature of Sequential Experiments

Before describing the objectives of the present experiments, it may be in order to say a word about the nature of sequential experiments. The author has deliberately moved toward a series of small, tightly designed experiments. These are, hopefully, so planned that one study is built on the knowledge gained from studies preceding it. Thus no attempt at grand generalizations or a full-flown theory is intended as an outcome. Rather, the same reformulation and directionality are sought in experimental research that are encouraged in the sequential drawing, learning-to-learn context created for subjects in the experiments. For this reason, one of the most general objectives of these two experiments is that in building upon prior research and upon each other, they shall also point to the next most likely experiments, to where the richest information lode is likely to be next.

General Summary of Experimental Setting and Conditions

Following the format of a previous learning experiment in drawing (6), both experiments utilized a constant drawing stimulus (or theme), a constant medium, and a series of uninterrupted and uninstructed studio periods, interspersed with evaluative sessions in which process feedback occurred. Subjects were college students, and sample classification variables included sex, amount of art training, and beginning art strategy or style as identified from uninfluenced drawings. Subjects worked singly in a "studio" consisting of a standard, fixed work area equipped with a "robot" timer and camera which, without interruption of the art process, systematically sampled "process" data on the evolution of each drawing.

As indicated, both experiments shared identical environment, working conditions, and sample classification factors. There were, however, key differences in the two treatment variables or factors, and therefore in the kinds of knowledge sought from the two experiments.

Experiment I

The first experiment was designed to be more "naturalistic," in the sense that there was minimal direct influence on the drawing task. By manipulating the stimulus conditions (still-life or mental theme), an implicit set was created. By varying the number of time-lapse photographs of drawing processes shown the subject during evaluative sessions, the effect of varying the amount of process feedback was studied. By changing the stimulus condition after a three week period, it was possible to study a transfer effect. At the end of the first experiment, subject's were given brief instruction in the nature of the two art strategies into one of which they had been classified and asked to simulate the opposite of what they perceived to be their own strategy. In this way, the flexibility, plasticity, or manipulability of drawing strategies was studied. Finally, by attempting to avoid direct influence and instruction, it was the intent to gather much process data on which a careful study of drawing strategies could be based, going much more into depth and analysis than in previous studies. There was also the general question of whether subjects would change or advance through an uninstructed series of drawings.

In summary, Experiment I attempted to remain "naturalistic" within the context of sequential drawings guided, in cybernetic fashion, by process feedback of varying amounts; begun under an implicit set conditioned by the nature of the stimulus (still-life or mental theme); and proceeding to a reversal of the stimulus condition for a study of a transfer effect. Finally, the student's ability to simulate a style or strategy opposite to what he perceived to be his own, was to indicate how manipulable drawing styles may be.

Experiment II

The second experiment was generally planned as closer, in spirit, to psychological learning theory. It was, however, guided by knowledge obtained from Experiment I. In Experiment II a clear and rather detailed and progressive induced set was created by means of verbal and pictorial instruction intended to influence the subject to draw in one or the other of the two drawing strategies. Holding process feedback constant, the nature of the learning feedback was influenced by the use of a direct or indirect teaching method (this condition also affected the brief planning period following stylistic instruction). While transfer effects were not studied in the same manner as in Experiment I, there was an uninfluenced drawing session (after the treatment sessions) where the persisting influence of the induced set could be examined.

It should also be mentioned that the possible interaction of the three classification factors (sex, art training, beginning strategy or style) with the two treatment factors were under study in both experiments. Outcomes of both experiments were analyzed using three dependent variables: detailed criteria judgments in each of the two drawing strategies and a judgment of aesthetic quality, the former judgments being made from the process photographs of each drawing, the latter from the original final product itself.

Chapter II

Method

I. The Laboratory Studio Environment

As mentioned in Chapter I, subjects worked one at a time at a drawing table, at which they could sit or stand. A frame of wood positioned a 12" x 18" white drawing pad in either a vertical or horizontal position, according to the subject's choice. This positioning was required to insure that the pad would be fully covered by the camera. The camera itself was completely removed from the subject's vision and working area. It picked up the drawing pad from a front-surface mirror which was mounted at a 45 degree angle above the drawing table surface. Figure 3 on page 14 illustrates the drawing table with its overhead mirror.

Standard tools and medium were used throughout both experiments. The medium was black india ink, mixing pans, with water available for cleaning brushes and mixing washes. The tools included a pen for relatively fine line (but distinct enough to be easily photographed), a fine line sable, medium sable, an inch wide sable flat, and a medium Japanese brush. Except for the three sable brushes, the same medium, tools, and drawing pad were used in the experiment preceding the present study (6).

The camera used in this study was a single frame 35mm German made "Robot," which is electrically operated and controlled by an automatic timing device. A magazine attachment allows up to a 200 foot roll of film to be used. Kodak Plus-X film in 100 foot rolls were used in this study. Up to 1500 shots can be taken on each 100 foot roll of film. Figure 4, page 15 shows the Robot camera and timer in place, behind a wall dividing it from the drawing area and positioned in front of a window opening on the front-surface mirror.

In both experiments, an assemblage-like, multi-sided still-life, shown in Figure 5, page 16, was used at special times, as defined later. This still-life is the same one used in earlier experiments (6). It is mounted at desk height on a stand with rollers and is easily positioned according to a subject's preference. When not in use, it was pushed out of sight into an enclosure in the room arranged for that purpose.

The room in which drawings were made was used only for the experiment, so that privacy and control were possible. The room was subdivided into a hall-like entrance; a waiting area in which were desks, tables and chairs; and the drawing area, set off visually and physically from entrance and waiting areas. Although a bank of windows supplied light in addition to flourescent lighting, the windows opened onto the waiting area and the subject could not see out of them when he was drawing.

When during the experiment, a subject looked privately or with an instructor at his process feedback material, this was done in the waiting area. In Experiment I the time-lapse process photographs were stored in rolls. The appropriate roll or rolls were spread before the subject while he performed his evaluations. In Experiment II, where quantity of process feedback was held constant, each week's session was represented by a brown paper folder 36" wide, to which was attached the appropriate time-lapse strips (the prints were

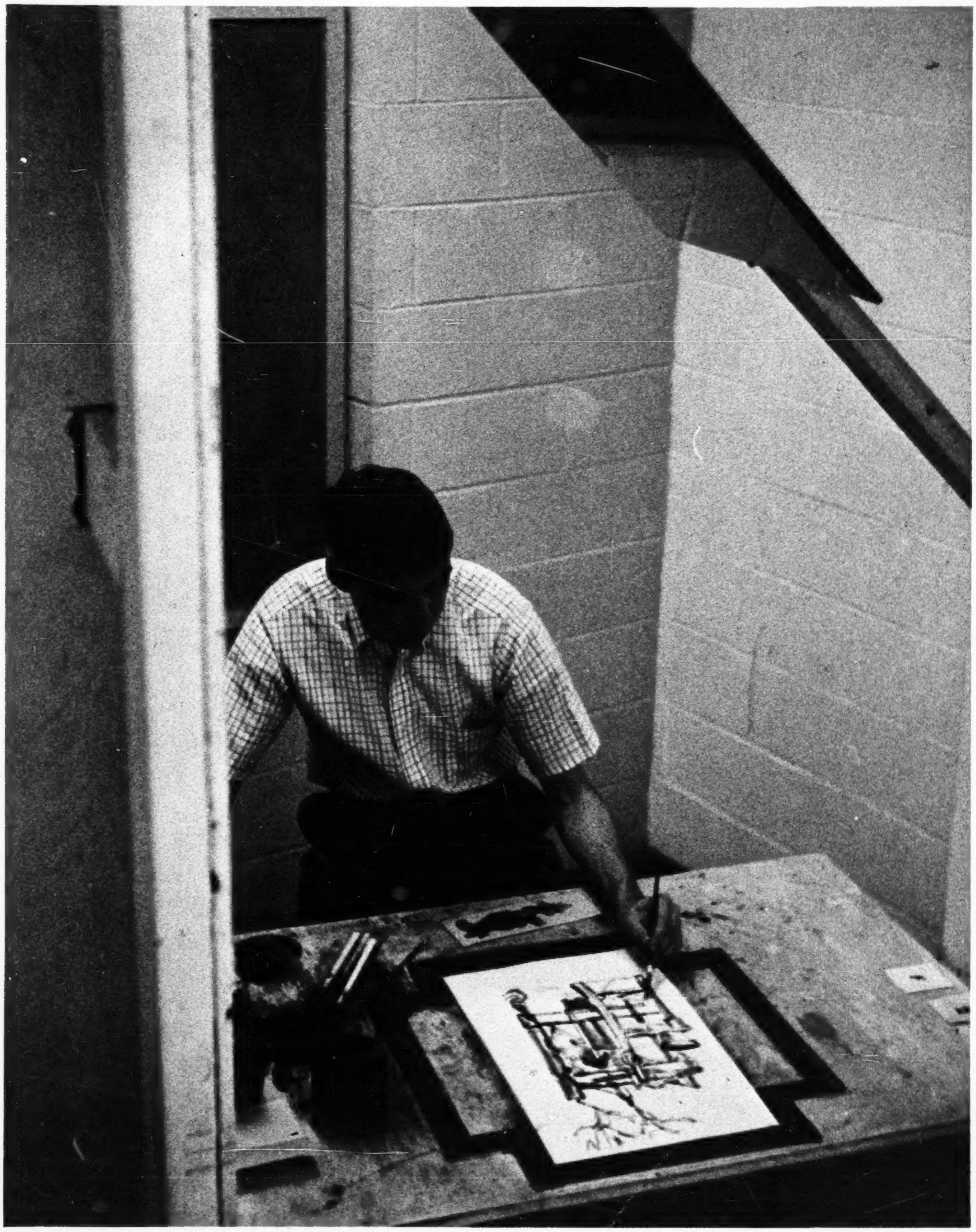


Figure 3: Drawing Table with Overhead Front-Surface Mirror

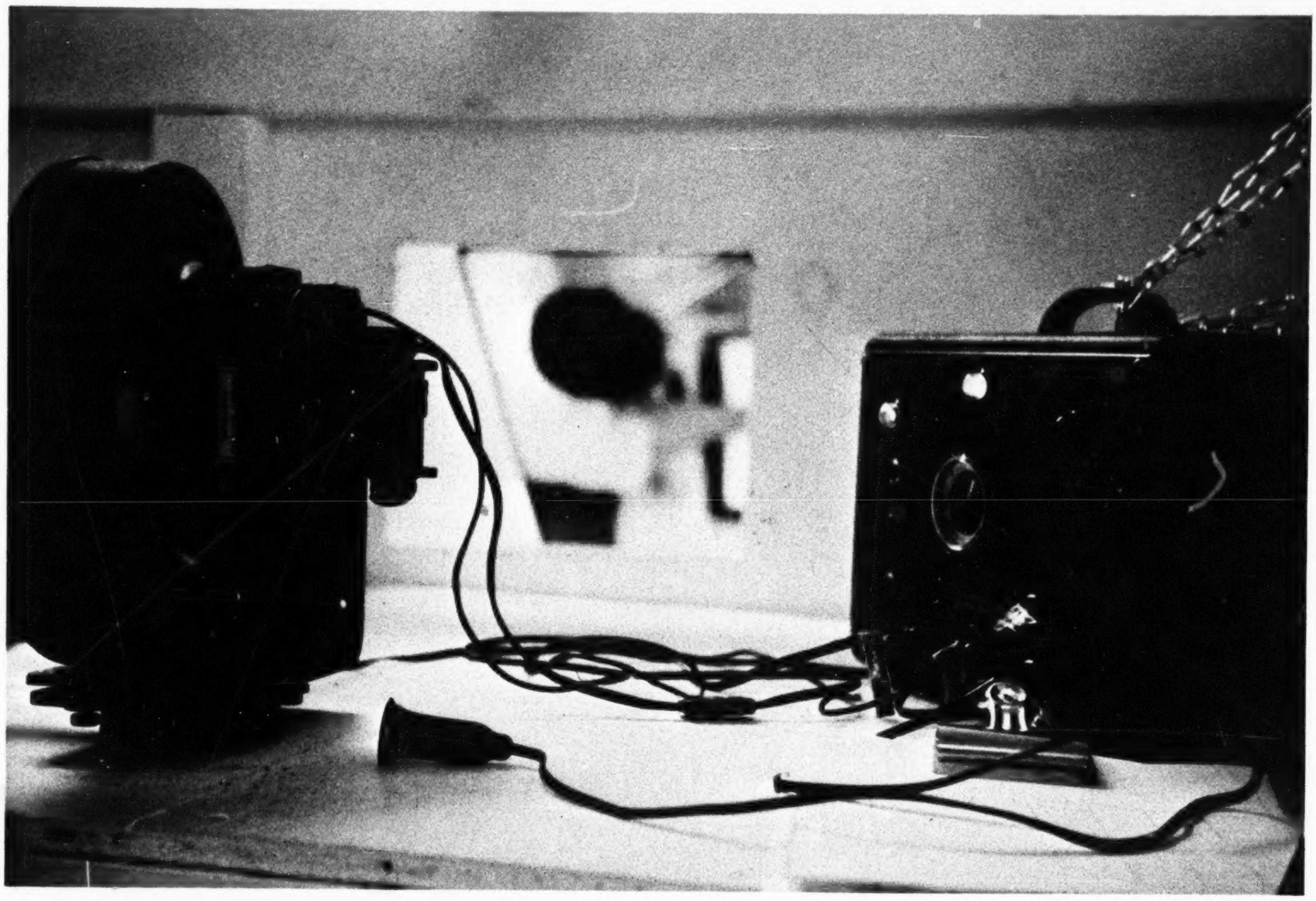


Figure 4: Electronically Activated Robot Time-Lapse Camera and Timer

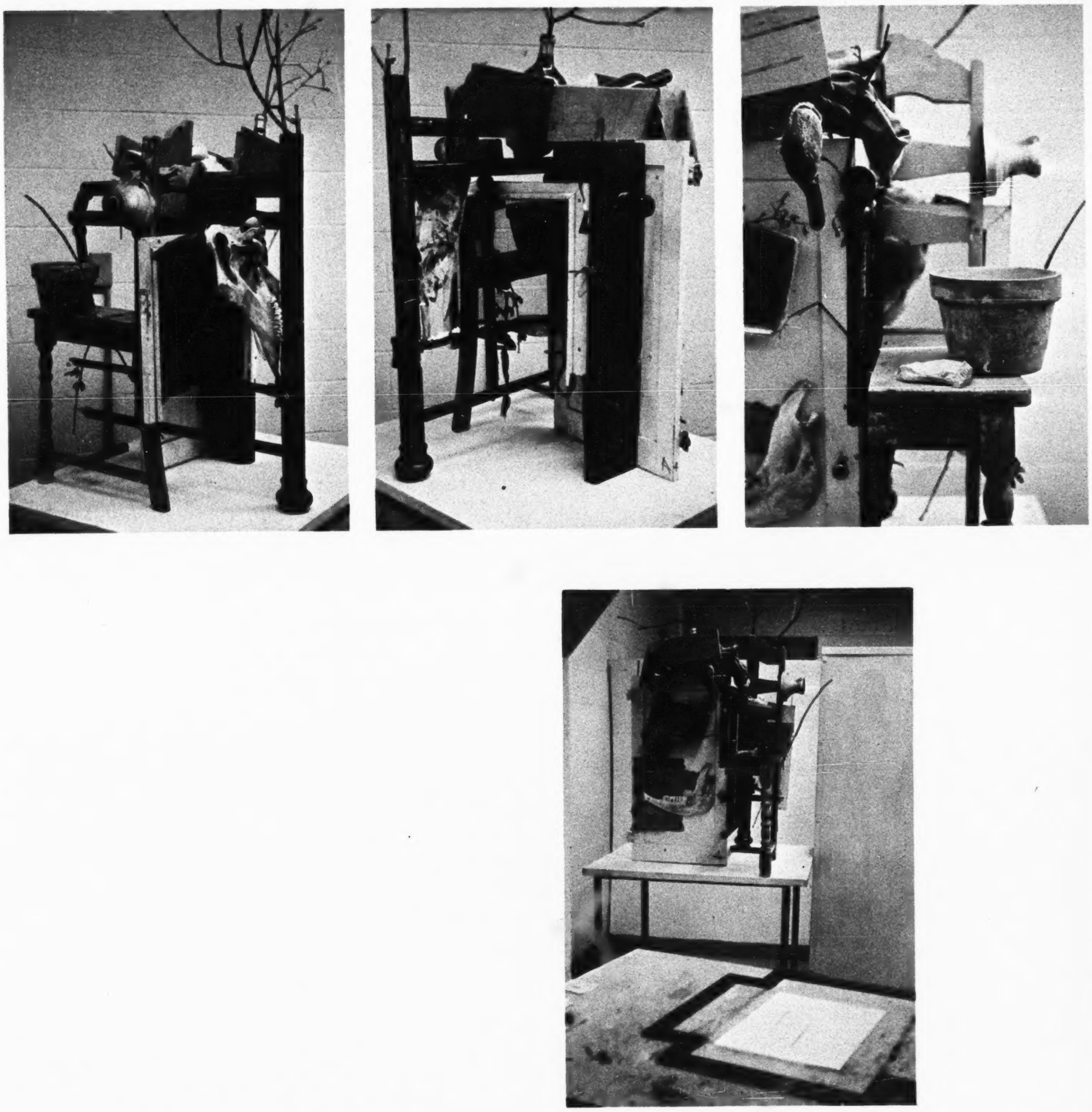


Figure 5: Assemblage-Like, Multi-Sided Still-Life Stimulus (on Movable Stand)

standard "jumbo" size and were received in uncut rolls). Figure 6, page 18, shows a student with an instructor examining a process feedback folder representing one week's work.

In Experiment I, timing of the camera was variable. In the first drawing session, all subjects were introduced to a faster (one minute) and comparatively slow (five minute) timing of the camera to acquaint them with the sound of the device and the environment in general. Thereafter, they were asked to choose their predicted desired working time from a chart drawn up for this purpose. Subjects were asked to slightly underestimate the time they desired. In this way, an attempt was made to get at least 20 time-lapse process shots for each drawing. The camera was so set that the time interval chosen was divided into 20 smaller intervals, with the exception that a minimum of three shots were taken the first minute regardless of the chosen interval (these could be hand interpolated, if necessary, by means of a push button). As an example of this system, the one minute interval was set for shots every three seconds. The five minute interval was set for a shot every 15 seconds. Nothing was said if a student greatly underestimated or overestimated his predicted and chosen time.

In Experiment II, a standard camera setting was used for timing the intervals at which process shots were taken. During the first minute, three shots were taken. During the second and third minutes, two shots were taken. Thereafter, shots occurred every minute until completion.

In both experiments, upon completion of a drawing, a final or finished shot was taken with labels at the side of the pad identifying the student, the week, the drawing number in that series, and (in Experiment I only) the time interval chosen.

II. Experiment I

Experimental Design

Table I, page 19, summarizes in concise form the problem, the duration, the design, and the general procedure used in Experiment I. The terminology used in the table will be adhered to in later discussions.

In the "Duration" section of Table I, the subdivisions of the seven weeks into five sub-categories occurs: (1) pre (weeks A and B), (2) treatment (weeks C, D, and E), (3) transfer (week F), (4) switch (first drawing of week G), and (5) post (subsequent drawings of week G). Just preceding drawing during the sessions in weeks C, D, and E, self-evaluation occurred, using an evaluation form (see Appendix C, page 179), with "plus" or "minus" process feedback as its raw material. In addition to performing the self-evaluative tasks included on the form, subjects rated one of their time-lapse drawing process series from each of these three periods on selected semantic differential scales from the work of Osgood (30). These scales represented the major dimensions of Osgood's semantic space: evaluation, activity, and potency. These dimensions constituted exploratory dependent variables, supplemental to the main ones and based on the subject's perception of his own work.

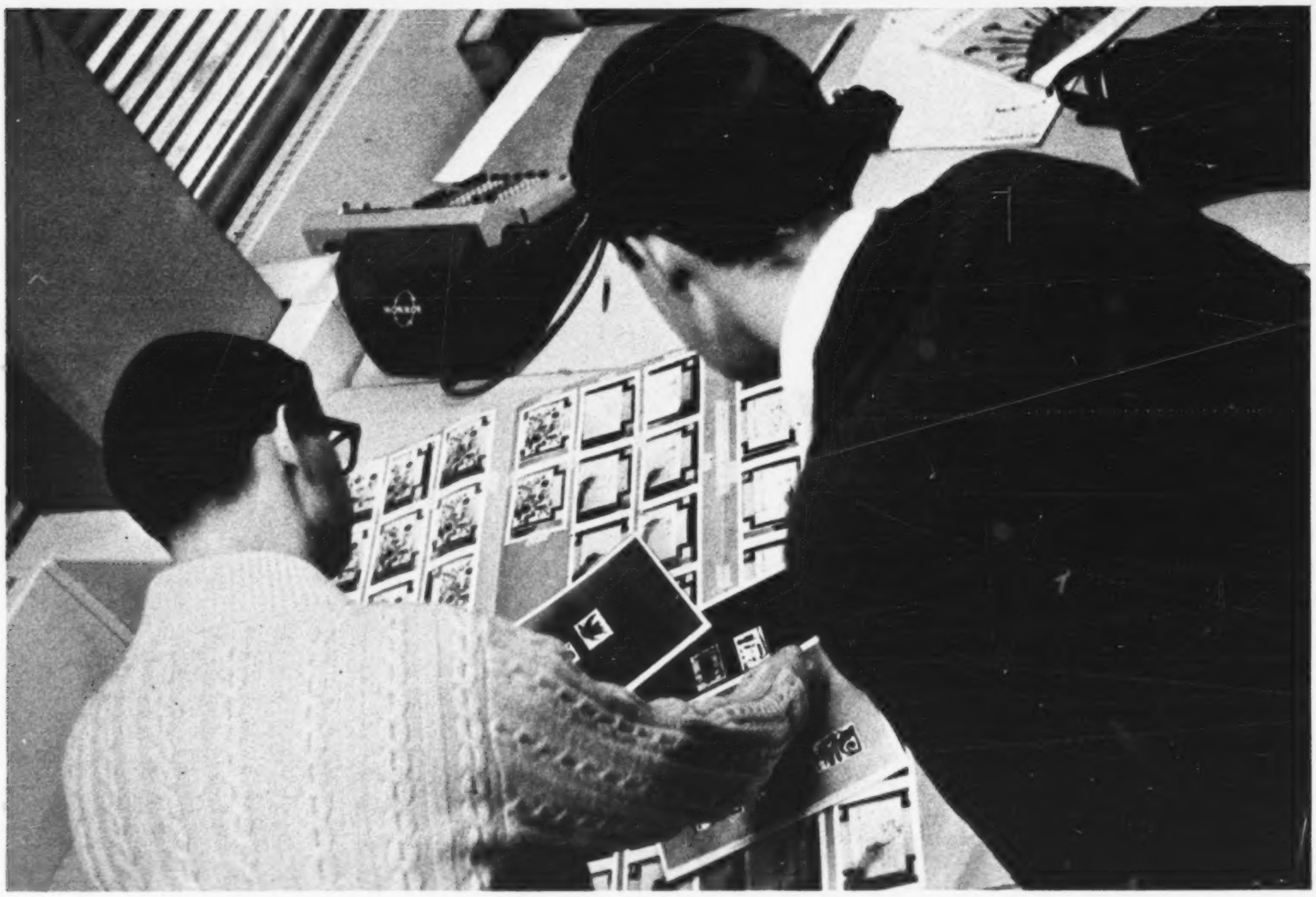


Figure 6: Student with Instructor Studying Previous Week's Time-Lapse Process Photos

Table I

Experiment I: Design of the Experiment

PROBLEM: The effect of variation of stimulus set (drawing theme) and amount of process feedback on the art style and aesthetic quality of drawings of classified college undergraduate subjects in a sequential drawing setting.

DURATION: Seven consecutive weeks, one hour weekly (each subject averaging about 18 drawings over the 7 weeks). Time line as follows:

Week:	A B	*	C * D * E	F	G
	Pre		Treatment	Transfer	Switch strategy and Post

* = feedback occurs prior to drawing series

DESIGN: The Independent Variables are as follows:

Factor	Name	Level I	Level II
A	Sex	Male	Female
B	Art Training	Art Major	Non Art
C	Pre Strategy	Spontaneous	Divergent
D	Stimulus Set	Still-Life	Mental Theme
E	Feedback	Plus: 2 picture process strips	Minus: 1 picture process strip

Note: N=32. Because this places only 1 S in each cell, all 4 factor interactions are incorporated into the error term (giving it thus 6 instead of 1 d.f.) The experiment is a 2x2x2x2x2 balanced analysis of variance.

Dependent Variables:

1. Spontaneity (9 criteria-singly, and as a total score, 3 factor scores, as judged from process photographs)

2. Divergency (9 criteria-singly, and as a total score, 3 factor scores, as judged from process photographs)

3. Aesthetic Quality (judged from final products)

PROCEDURE: Materials: pen, India ink, brushes (4 sizes), standard 12 x 18 white pad, choice of V or H format; water available for washes.

Records: Drawings are photographed by a robot electronic 35mm camera which is out of sight and operates off an overhead front surface mirror. During week A all S's were exposed to both stimulus set conditions and a fast and slow camera setting. Approximately 12,000 process photos were printed (minimum = 20 per drawing; A week not printed). Subjects chose the camera time setting from an available chart, basing their choice on a minimal time prediction.

As in prior research in this series (6), the subject was given evaluative tasks on the form which kept him looking at the series showing his drawing processes. He was asked to designate stages, describe what he thought he was trying to do, etc. He was then asked to project his thinking toward his next drawing. No external direction was given, nor did the researchers interact with the subject or reinforce his evaluative or drawing behavior. It is impossible to say whether any reinforcing of behavior occurred or not, but fair to state that a conscious effort was made to avoid it. In a subtle way, energies were bent toward testing drawing change in a relatively "suspended" social field, to see what the classification variables, simple implicit set and process feedback variables (treatment variables), sequence of drawings, and self-evaluation would themselves do to cause change.

The main dependent variables were those of strategy or style, and aesthetic quality. the former were judged using 18 detailed strategy criteria, nine in each strategy (spontaneous and divergent). Judging was done at the completion of the experiment, taking the time-lapse series of one drawing at a time, applying one of the criteria, then moving to the next drawing series, etc., until all drawings were judged on that criterion. Three judges were used, in this case the researcher and his two assistants, working singly. It is estimated that about 25,000 separate judgments were thus made to cover all the criteria for all the drawings. This task took eight weeks to complete, just in the judging and recording phase.

The criteria used appear in Table II, page 21. The 18 criteria listed represent the 40 earlier devised by the author and Burkhart (6). Pictorial examples from the earlier studies were chosen and agreed upon by the judge team prior to judging. It should also be stated that several weeks of pilot judging and rewording of criteria took place before the 18 finally agreed upon criteria with their pictorial examples were applied to the drawing series from Experiment I. In the final judging, a three-point sorting took place: (1) 0 = criterion absent; (2) 1 = criterion present, but weak; and (3) 2 = criterion present strongly. Data on judge reliability and cross-checking with judges not associated with the study or the criteria will be discussed in the next chapter.

It may seem a practice of dubious objectivity to involve the researcher and his assistants in judging the work produced in the experiment. Several things need to be discussed in this context. First, while called "judgments," the sorting of drawing sequences on the two strategy criteria is a relatively objective task, although as will be later shown it requires experience and training. The criteria are meant to be descriptive, not qualitative in an evaluative, good-bad sense. This, of course, does not apply to the aesthetic quality judgment, which is clearly evaluative and dependent on "expertise" or accumulated experience and training in art.

Two justifications for the procedure used in Experiment I will be given. First, as explained earlier, Experiment I was itself regarded as more naturalistic in intent. Neither the researcher or his assistants were consciously biased in favor of one or another treatment or classification variable. Secondly, the burdensome amount of time and energy required for such judging could not be expected of any judge team available to the researcher. The commitment required for the eight week period was close to total. In Experiment II, however, where more active treatment conditions existed, and where, as a result of the analysis of judgments from Experiment I, simpler and less time-consuming judgments were involved, new research assistants not present when the experiment took place were trained and utilized.

Table II

Experiment I: Criteria Used for Detailed Strategy Judgment of Drawing Processes

TYPE OF LINE	1.	Diversity of line; open or broken contours (process related) (S)
	2.	Fine line control with limited line variation (D)
BEGINNING	3.	Overall early structural statement, undetailed but inclusive; central emphasis (S)
	4.	Single element focus, detailed and partial; off-center emphasis (D)
MEDIUM USAGE	5.	Abrupt medium changes (D)
	6.	Continuous medium variation (S)
DETAIL	7.	Suggestion (S)
	8.	Elaboration; precision; pattern (D)
MOVEMENT	9.	Direct, flowing movement; action gestures (S)
	10.	Concern for contour; formal distortion (D)
SPACE	11.	Plane: eye travels path of forms; frontal plane; position in space affirmed; floating; lateral tension; transparencies and overlapping of flat planes (D)
	12.	Recession: eye penetrates space; many planes, not clearly separated; position in space sought; depth tension (S)
CONTRAST AND TEXTURE	13.	Irregular broken lights; medium as texture (S)
	14.	Solid regular areas of black and white; black-white reversals; surface patterns (D)
THEME	15.	Emphasis on process and medium usage; objects of subordinate interest (S)
	16.	Size relationships manipulated (D)
	17.	Theme and variation of same element (D)
	18.	"Organic" and progressive development; enrichment of initial overall structure (S)

Although such detailed judging took place on the strategy criteria in Experiment I, the total score obtained from grouping the nine criteria in each strategy was the dependent variable used to interpret the experiment. There were several reasons for this. First, although criterion by criterion analyses were made, the volume of data thus involved (144 separate analyses of variance) is too great for inclusion and interpretation. Had there been, however, clear differences and any structure to this volume of analyses, they would have been included. Secondly, the criteria within each strategy were so highly intercorrelated that they actually operated like a unit. Later discussion on the structure of the detailed strategy criteria will make this clear.

In addition to the three main dependent variables, a number of exploratory and descriptive subsidiary dependent variables were included for analysis. These included the total scores on the three dimensions of the Osgood Scales (evaluation, activity, and potency) which the subjects applied to their drawing sequences during the three evaluation sessions (treatment period). Two descriptive dependent variables which were also analyzed were the picture format choice patterns of the subject -- that is, the number of horizontal or vertical pictures made where free choice existed.

Sample

The subjects were undergraduate college students, largely sophomores. Since subjects were classified by sex, amount of art training (art majors and non-majors), and beginning art strategy (spontaneous or divergent), these were the conditions controlling participation in the experiment. Other conditions which were influential in determining membership had to do with schedule. With 35 students participating (three additional subjects were carried through the experiment), it took careful planning to set up the 35 one hour periods within the 44 weekly work hours available. Apart from these considerations, subjects were volunteers solicited from a number of classes in art, art education, and general education (a large humanities class in art, music, and theater). All subjects knew prior to beginning the experiment that if they completed the seven weekly sessions they would be given a ten dallar honorarium in recognition of their time and energy commitment. This aspect, however, was not stressed. Emphasis was rather placed on the chance to draw, study time-lapse photos of drawing processes, etc. To the best of the researcher's knowledge, as gathered from interveiw at the close of the study, the drawing and feedback process was itself intrinsically motivating to subjects.

Subjects were classified according to strategy on the basis of the drawings they made in the pre-treatment period (weeks A and B). In each of these two weekly periods subjects were asked to make two drawings (more if desired), one of which was to be from the still-life, one from mind. In either case, they were told to take whatever approach they wished to. The order of the two kinds of drawing stimuli was randomly varied across subjects, and within subjects from the first session to the second. If a subject did more than two drawings in either session, in these he could work under either condition.

The researcher and his two graduate assistants, working independently, judged the drawing sequence photos and the final products in the following manner. Each drawing was placed in one of three classes: (1) more spontaneous than divergent, (2) indeterminate or equal, and (3) more divergent than spontaneous. The total of these placements, across drawings and judges, determined which strategy most fairly represented each subject. From the three subject blocks (sex, art training, and strategy), subjects were then assigned to treatment cells.

Following the transfer period (week F) subjects were again given their choice as to which drawing stimulus condition they wished to work under (week G, switch and post drawings). Their choices will be described later.

Method of Analysis

Multiple-factor analysis of variance was used to analyze Experiment I. The experiment was tightly designed and yielded a great quantity of data in the form of drawings and approximately 12,000 time-lapse process photos. Classification factors, A, B, and C, were designed to control for subject differences that might interact with treatment and environmental conditions, and also to increase the potential for greater generalization of findings. Earlier studies (6) had been largely with female art subjects. Although the three classification factors were considered quite important, it was the two treatment factors which were the main focus.

The time and data volume problem led to having only one subject in each of the 32 cells (of the five factor experiment, with two levels in each, 2x2x2x2x2 = 32). Since interpretations of four-way interactions is next to meaningless and impossible (especially with only two subjects in a sub group), the decision was made to incorporate all the four-way interactions into the error term. This also raised the degrees of freedom for the error term from one to six.

A gain-loss or change index was the principal method of arriving at a score for each dependent variable. The pre session (weeks A and B) constituted the base or benchmark to which all later periods of the experiment were compared. A single score represented each period. This was based on the total of the judge scores assigned to all of the drawings of that period.

There were four gain scores thus generated for each dependent variable: (1) treatment gains (treatment total minus pre), (2) transfer gains (transfer total minus pre), (3) switch gains (switch score minus pre), and post (post total minus pre). By keeping the pre session as a base or benchmark to which all later variation could be compared, a constant point of reference was maintained for discussion and analysis.

III. Structure of the Detailed Art Strategy Criteria

The drawing sequences obtained from Experiment I were judged, as previously described, on 18 separate criteria, nine spontaneous and nine divergent, by three judges working independent of each other. Some 25,000 judgments were thus performed. After checking for judge reliability, the scores for all judges for each drawing on each criterion were pooled. The average number of drawings made by each subject over the seven week period was 15, or around two drawings per week.

With N=480 (drawings), the 18 strategy criteria were intercorrelated. The resulting matrix was then submitted to a principal components factor analysis and then to a varimax rotation of the factor loadings. A six factor solution was chosen as revealing simple structure best. These results will be discussed in the next chapter.

IV. Experiment II

Experimental Design

Table III, page 25, summarizes in concise form the problem, the duration, and the general procedure used in Experiment II. The terminology used in the table will be adhered to in later discussions.

In the "Duration" section of Table III the subdivisions of six weeks into four subcategories occurs: (1) screening (week O), (2) pre (week A), (3) treatment (weeks B, C, and D), and (4) post (week E). Just preceding drawing during the sessions in weeks B, C, and D, treatment conditions were applied (factors D and E).

Unlike Experiment I, in Experiment II an explicit induced set (factor D) of an instructional nature was mediated by the researcher and his two graduate assistants acting as instructors during the pre-drawing evaluative session of the treatment period (weeks B, C, and D). Since three instruction periods were involved, the instructors were randomly assigned so that each subject was instructed by all three instructors.

Table IV, page 26, explains Factor D, the induced set, having as its content stylistic instruction. Taking a lead from Experiment I in which, as later discussion will show, subjects appeared to be able to easily manipulate their styles or strategies (as indicated in the "Switch" drawing of week G), Experiment II attempted to assess the power of "teaching a style" in a direct manner. This directness refers to the content of instruction. As Table IV indicates, this content consisted of the clusters of criteria derived from the factor analysis of the 18 strategy criteria from Experiment I data. The six factors thus derived, three spontaneous, three divergent, became the content for Factor D for the three treatment weeks. An instruction schedule, given in Table IV, shows how the style or strategy factors were presented in sequence. Instruction consisted of the verbal labels of the criteria appearing under the style factor on the schedule, compared with its most opposite factor on the other style, along with pictorial examples of each criterion. Several drawing sequences, either from the still-life or from mind, obtained from Experiment I, which showed the presence of the factor in question were also shown the subject.

At this point, after instruction to create the induced set, the teaching method for planning the attack on the drawing to follow or for mediating learning feedback after drawings were begun under instruction, was varied. A direct or indirect method of instruction was used. In direct instruction, the teacher pointed out to the subject where he, the teacher, saw some sign of the factor which was the content for instruction in the student's drawings done previously; or, if this was not possible, where the opposite condition existed. He then presented ways in which the subject might achieve the qualities of style or use the strategy exemplified in the verbal labels and pictorial examples. ("Style" and "strategy" are both used in this context because the criteria refer both to "ends" and "means.") In

Table III

Experiment II: Design of the Experiment

PROBLEM: The effect of direct and indirect stylistic instruction on the art style and aesthetic quality of drawings of classified college undergraduate subjects in a sequential drawing setting.

DURATION: Six consecutive weeks, one hour weekly. Time line as follows:

Week:	O	A	* B * C * D	E
	Screening	Pre	Treatment	Post

* = feedback and instruction occurs prior to drawing series

DESIGN: The Independent Variables are as follows:

Factor	Name	Level I	Level II
A	Sex	Male	Female
B	Art Training	Art Major	Non Art
C	Pre Strategy	Spontaneous	Divergent
D	Stylistic Instruction	Spontaneous	Divergent
E	Teaching Method	Direct	Indirect

Note: N=32. Because this places only 1 S in each cell, all 4 factor interactions are incorporated into the error term (giving it thus 6 instead of 1 d.f.). The experiment is a 2x2x2x2x2 balanced analysis of variance.

Dependent Variables:

1. Spontaneity (3 factor scores-corresponding to instructional periods, and a total of these, as judged from process photographs).

2. Divergency (3 factor scores-corresponding to instructional periods, and a total of these, as judged from process photographs).

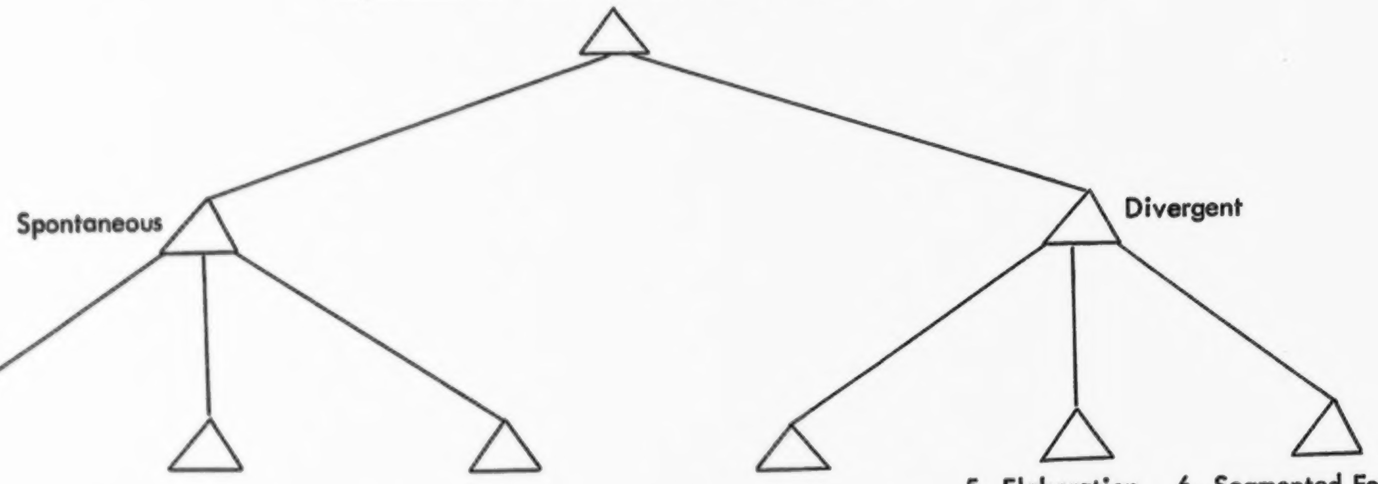
3. Aesthetic Quality (judged from final products)

PROCEDURE: Materials: pen, India ink, brushes (4 sizes), standard 12 x 18 white pad, choice of V or H format; water available for washes.

Records: Drawings are photographed by a robot electronic 35mm camera which is out of sight and operates off an overhead front surface mirror. Approximately 8,000 process photos were printed. A standard time setting was used (3 shots for the first minute, 2 shots for the second and third minutes, 1 shot per minute thereafter).

Table IV

Experiment II: Factor D, Stylistic Instruction[1]



1. Process Dialogue
   - (a) Diversity of line (1)*
   - (b) Suggestion (7)
   - (c) Action gestures (9)
   - (d) Process emphasis (15)
2. Spatial Continuity
   - (a) Medium variation (6)
   - (b) Recession (12)
   - (c) Broken lights (13)
3. Big Central Attack
   - (a) Early statement (3)
   - (b) Organic development (18)
4. Controlled Detail
   - (a) Fine line control (2)
   - (b) Single element, off-center (4)
5. Elaboration and Pattern
   - (a) Abrupt medium changes (5)
   - (b) Pattern (8)
   - (c) Solid black-white (14)
6. Segmented Form and Space
   - (a) Formal distortion (10)
   - (b) Plane (11)
   - (c) Size manipulated (16)
   - (d) Theme and variation (17)

Instructional Schedule

	Spontaneous Style	Divergent Style
B Week	1 vs. 5	5 vs. 1
C Week	2 vs. 6	6 vs. 2
D Week	3 vs. 4	4 vs. 3

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[1] The six clusters are the result of a Factor Analysis of the 18 strategy criteria judged in Experiment I.

*Numbers in parentheses refer to the original 18 criteria in Experiment I.

indirect instruction, the teacher asked the subject where signs of the factor, or its opposite, could be found in the subject's work, and how the subject thought he might achieve the designated qualities in his own drawings. The instructors dubbed these two methods of mediating planning and feedback "tell" and "hear," respectively.

The general procedure for instruction was otherwise the same for all subjects in Experiment II. The subject would be instructed in the meaning of a particular factor of one of the styles (with its opposite available for comparison) by means of verbal labels of the criteria matched with pictorial examples and finally applied as a total factor to a representative group of drawings (and their process series). He would then move toward identification of presence or absence of that factor in his own drawing series from the prior week, thence to planning how to achieve that factor in his next drawings. Each week of the three treatment weeks dealt with a different specific factor, following this same procedure. Instruction was thus cumulative, but the factor or factors from a prior week or prior weeks were not present in weeks C and D. Only the content for instruction for that week and the subject's drawing series from the prior week were present.

One other condition was adhered to in Experiment II which was an outcome of Experiment I. Again, as later discussion will show, the implicit set created by the still-life and mind drawing stimulus conditions was such that the still-life appeared to reinforce the divergent strategy, while the mind stimulus condition strengthened spontaneous tendencies. Hence, in Experiment II, as a control factor, subjects were assigned to one or the other of these two conditions as a constant, once they were classified as a result of the drawings they made (under both conditions) in the screening week (week O).

The main dependent variables in Experiment II were those of strategy and aesthetic quality. As in Experiment I, strategy judgments were made from the time-lapse process photos, while aesthetic quality was judged from the final products.

For judging strategy, a subject's one week or one session folder was judged as a unit. Although often two or more drawings appeared in a week's folder, in very few cases did judges report troublesome inconsistency in style. As previously, subjects and weekly folders were randomly mixed. The screening week (week O) was also included for judgment.

Strategy judgments matched the six factors obtained from the factor analysis of the 18 strategy criteria of the data from Experiment I. Thus judges made their assessments on the basis of the same strategy content breakdown used for instruction, as shown in Table IV. From these factor scores, each judged on a one to five scale, were obtained total spontaneous and divergent scores. Both the six factor scores and the totals were used for the analyses of variance. Aesthetic quality was likewise judged on a five point scale, from the original drawings.

Two new graduate research assistants, as before, joined the researcher as judges. Training sessions were held on drawing series from Experiment I. The researcher felt that his own participation as a judge was justified by the correlations obtained between his judgments and those of the new judges, who were not informed about the conditions of the study until after they had done their judging. Again, the researcher had no conscious bias toward one or the other condition, as a review of judge intercorrelations should reveal. As a matter of fact, in such cases where the researcher had hunches, as in feeling that non-art students would show improvement in aesthetic quality as the result of any kind of stylistic instruction, these were not borne out by the judging. In short, analysis with or without the researcher on the judge team would yield the same outcomes.

Several additional, descriptive dependent variables were studied. The length of time subjects spent on a drawing was voluntary. It was assumed, however, that working in the divergent strategy would on the average require more time for completing a drawing. To check out this assumption, an analysis was made using time as a dependent variable. Since a constant time schedule was used to take time-lapse process shots for all subjects in Experiment II, the number of photographs in a series could be translated directly into a time score.

One of the graduate research assistants became greatly interested in physiological activation level during drawing, as measured by the galvanic skin response (GSR). He wondered whether there would be any patterns associated with characteristics of the sample or with treatment conditions. It was possible to obtain a Stoelting Dermograph to allow him to pursue this interest. During the last three weeks of the experiment (C, D, and E), all subjects drew with electrodes fastened to two fingers of their non-dominant hand. A running record of their GSR patterns was thus obtained. The recording device was out of sight of the subjects. These GSR records were later analyzed for amplitude and frequency of response. A brief summary of these data will be given later.[1]

Sample

Experiment I encountered some inequalities in sample classification variables. It had proven relatively easy to find spontaneous and divergent drawing styles among the art and non-art female subjects. Among male subjects, however, it was difficult to find adequate representation of the divergent style with art males and, conversely, the spontaneous style among non-art males.

To better balance the cells of Experiment II in the three classification factors, it was decided to call the first week a screening week. In this week a group of subjects nearly twice as large as needed was screened. Among art males, students concentrating in architecture and design were included along with those concentrating on painting and sculpture. It was then possible to locate more art males working in the divergent style and also, with more choice, clearer cases of the spontaneous style among non-art males.

Beyond this screening of a larger group, the sample was comparable to that of Experiment I, with greater strength in Factor C (strategy or style classification). It should be stated that Experiment I took place during Fall Term, 1965, while Experiment II was during Spring Term, 1966. Winter Term was devoted to judging and analyzing Experiment I. During Summer Term, 1966, Experiment II was judged and analyzed.

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[1] The full report will be found in the doctoral thesis of James J. Johnson, Jr., The Pennsylvania State University (in progress).

As in Experiment I, subjects were largely sophomores. Concentration at this level was suggested by comparison of style classification among art subjects in an earlier study (6), in which it was found that freshmen and sophomores could be more easily classified in both styles, whereas upper-class art students worked predominantly in the spontaneous style.

Method of Analysis

Experiment II has the same general design as Experiment I. It is a balanced multiple-factor analysis of variance design with five factors with two levels each. Factors A, B, and C are classification factors (sex, art training, and strategy or style), and factors D and E are treatment factors (stylistic instruction and teaching method, representing induced set and learning feedback conditions). The experiment lasted six weeks and accumulated a quantity of process records (around 8,000 photographs).

As in Experiment I, there was but one subject per cell (2x2x2x2x2=32). This would leave only one degree of freedom in the error term. As before, the five four-way interactions were judged beyond interpretation, if they were significant, and were incorporated into the error term, changing its sum of squares and raising the degrees of freedom to six. The three classification factors did not receive the same degree of attention as the treatment factors. They were adjudged to be most important when they interacted with treatment factors. In effect, the design is a 2x2 experiment with sample controls.

Gain or change scores again were derived for the analyses. There were two kinds of gain scores, both referring back to the pre-treatment drawings as the base or benchmark: (1) treatment gains (treatment period minus pre), and (2) post gains (post period minus pre). The chief dependent variables were the total spontaneous and divergent strategy scores and aesthetic quality. Analyses were also made using each of the six strategy factor clusters (three spontaneous, three divergent) which matched the instructional conditions during the three treatment weeks. The drawings were judged using these six strategy clusters and aesthetic quality. In addition, descriptive analyses were made using drawing time, and frequency and amplitude of GSR patterns.

Chapter III

Results

I. Experiment I

Reliability of Judgments

Table XII, Appendix A, page 92, summarizes reliability estimates for the three trained art judges on the 18 strategy criteria, over all drawing sequences from Experiment I (N=480). Using the figures appearing in column three of Table XII (derived from the formula based on number of raters and average inter-judge agreement, as indicated on the bottom of Table XII) as the fairest estimate of reliability, coefficients vary between .770 and .881, with an average of .819.

In an effort to learn what role art background and judge training placed in such judgments, and as a check on the judge team (who were closely associated with the experiment), two doctoral students in art education and two non-art majors (an undergraduate engineering student and the project secretary) judged a subsample of the drawing series. This subsample consisted of 105 drawings. Three drawings were selected randomly from the pre, treatment, and transfer period of each subject (in other words, 3x35=105 this figure including the three extra subjects who were carried through the experiment[2]). Four of the 18 criteria, two spontaneous, two divergent were judged by these two kinds of judges. On the average, the untrained non-art correlated better with the trained art team (r= .466) than did the untrained art (r= .404). Criterion 8 (elaboration, precision, pattern: divergent strategy) for some reason was the least reliable criterion judged. In general, it appears that for strategy judgments, unlike aesthetic quality judgments, specific training in the meaning of the criteria (which are felt to be more descriptive than qualitative in the evaluative sense) is more important than art background. These results are given in Table XIII, Appendix A, page 93.

Analyses of Variance: Main Dependent Variables

Table V, page 31, summarizes the analyses of variance for treatment period gains on spontaneity total, divergency total, and aesthetic quality. Tables XIV, XVIII, and XXII, Appendix A, pages 94, 98, and 102, give complete figures for the analyses of variance summarized in Table V. No main effects or interactions are significant at the .05 or .01 level. Subjects classed as divergent tend to show gains in spontaneity and aesthetic quality over those classed as spontaneous (P= .10).

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[2] Not wishing to demonstrate any bias in the selection of students for the cells for which they were eligible, in the case of the three extra students their scores were averaged with those of their counterpart in their cells. In other words, in three cells an average score representing two students was used.

Table V

Experiment I: Summary of Analyses of Variance
for Treatment Period Gains on Spontaneity Total,
Divergency Total, and Aesthetic Quality
N=32

Source of Variation	Direction	Spontaneity Total F-Ratio	Spontaneity Total Probability	Divergency Total F-Ratio	Divergency Total Probability	Aesthetic Quality F-Ratio	Aesthetic Quality Probability
A	-----	-----	-----	-----	-----	-----	-----
B	-----	-----	-----	-----	-----	-----	-----
C	C-2>C-1	4.142	.10	-----	-----	4.912	.10
D	-----	-----	-----	-----	-----	-----	-----
E	-----	-----	-----	-----	-----	-----	-----
AE	-----	4.903	.10	-----	-----	-----	-----
CE	-----	4.011	.10	-----	-----	-----	-----
BCD	-----	4.903	.10	-----	-----	-----	-----

No other interactions were significant.

See Table I for factor names and subclass N's, p. 19.

Table VI, page 33, summarizes the analyses of variance for transfer period gains. This is the period in which stimulus conditions were reversed (factor D). Again, the summary covers gains on the spontaneity total, divergency total, and aesthetic quality. Tables XV, XIX, and XXIII, Appendix A, pages 95, 99, and 103, give complete figures for the analyses of variance summarized in Table VI.

Transfer period gains on the three main dependent variables showed one main effect, three two-way interactions, and three three-way interactions to be significant at the .05 and .01 levels. On the main effect, subjects classed as divergent show significant gains on aesthetic quality (P= .025) over their spontaneous counterparts, and this effect is free of interaction.

The three significant two-way interactions - AxB and AxD on spontaneity total, and AxD on divergency total -- are graphed in Figures 41, 42, and 40, respectively, Appendix A, pages 124, 124, and 123. The AxD interactions both show male subjects as being greatly influenced by a change in stimulus conditions, whereas female subjects show less change in their strategies. Moreover, male subjects move in the strategy direction generally associated with the stimulus condition (i.e., divergency with the still-life, spontaneity with mind stimulus), but female subjects make a slight movement in the unexpected direction.

In keeping with earlier statements about classification factors, attention will be focused on interactions involving these mostly where they interact with treatment conditions. Because of the number of subjects within a cell (eight as opposed to four), two-way interactions will also be given more attention than three way interactions.

Tables XVI, XX, and XXIV, Appendix A, pages 96, 100, and 104, give complete figures for spontaneity total, divergency total, and aesthetic quality on switch (simulation of perceived opposed strategy) gains. These tables, however, are not as revealing as are Figures 27 and 31, Appendix A, pages 117 and 119, which illustrate how in simulation of perceived opposed strategies the differences between subjects classed in the two strategies cancels out.

Tables XVII, XXI, and XXV, Appendix A, pages 97, 101, and 105, give complete figures for spontaneity total, divergency total, and aesthetic quality on post period gains. Because often only one drawing was done following the "switch" drawing at the beginning of the last session (week G), little interpretation of post gains will be made.

Tables XXVI, XXVII, and XXVIII, Appendix A, pages 106, 107, and 108, summarize the means for spontaneous total, divergency total, and aesthetic quality for treatment groups over the time line of the experiment (pre, treatment, transfer, switch, and post). Perhaps more useful in illustrating the dynamics of classification and treatment factors across these five time periods of the experiment are the figures which illustrate each of the main dependent variables, one factor at a time, over the experimental periods (five tine periods). Taking each factor separately and showing its two levels over the experimental periods, Figures 25 through 29, Appendix A, pages 116 to 118, summarize the dynamics of the spontaneous criteria total. Figures 30 through 34, Appendix A, pages 118 to 120, summarize the dynamics of the divergent criteria total. Figures 35 through 39, Appendix A, pages 121 to 123, summarize the dynamics of aesthetic quality. These figures will be discussed in Chapter IV.

Table VI

Experiment I: Summary of Analyses of Variance for Transfer Period Gains on Spontaneity Total, Divergency Total, and Aesthetic Quality
N=32

Source of Variation	Direction	Spontaneity Total		Divergency Total		Aesthetic Quality	
		F-Ratio	Probability	F-Ratio	Probability	F-Ratio	Probability
A	-----	-----	-----	-----	-----	-----	-----
B	-----	-----	-----	-----	-----	-----	-----
C	C-2>C1	-----	-----	-----	-----	11.299	.025
D	D-2>D1	4.819	.10	-----	-----	-----	-----
E	-----	-----	-----	-----	-----	-----	-----
AB	-----	12.767	.025	-----	-----	5.248	.10
AD	-----	29.124	.005	9.693	.025	-----	-----
AE	-----	5.685	.10	-----	-----	-----	-----
CE	-----	5.305	.10	5.216	.10	-----	-----
ABC	-----	4.819	.10	-----	-----	-----	-----
ABE	-----	15.719	.01	6.070	.05	-----	-----
BDE	-----	-----	-----	-----	-----	6.275	.05

No other interactions were significant.

See Table I for factor names and subclass N's, p. 19.

Table VII, page 35, summarizes the influence on strategy or style associated with treatment factor D (implicit set, still-life and mind), as this is revealed by treatment changes from pre, and transfer changes from treatment. These changes are examined for each of the 18 strategy criteria. Figures 28 and 33, Appendix A, pages 117 and 120, show the typical "X" pattern associated with treatment-transfer comparisons on factor D on the two strategy criteria totals.

Analyses of Variance: Subsidiary (Descriptive) Dependent Variables

Table VIII, page 36, summarizes subjects' self-ratings of their drawings during treatment periods on scales representing Osgood's evaluative, activity and potency dimensions of "meaning" (30). The scores analyzed are not gain scores, but consist of summations within each dimension over the period of three weeks (treatment, weeks C, D, and E) and across the three bipolar scales used each week in each dimension. For the rating form used, see Appendix C, page 180. What is being tested here, thus, is stability or consistency of self-ratings under the same treatment conditions, but on different drawings each time, and across three bipolar scales purportedly representing the same dimension in Osgood's system. (For complete detail on the separate analyses of variance on the Osgood Scales, see Tables XXXI, XXXII, and XXXIII, Appendix A, pages 111, 112, and 113.)

A close look at Table VIII indicates that one significant F ratio occurs under the Evaluative dimension. This is a main effect, free of interaction, in which subjects classed as Spontaneous (C-1) see their own drawings as significantly better (higher on a good-bad continuum) than do subjects classed as divergent (C-2).

It is on the Activity dimension, however, that the most significant F-ratios occur There is one main effect, again on factor C, but it cannot be interpreted unambiguously because there are three significant interactions and these all involve factor C. Figures 43 and 44, Appendix A, page 125, graphically portray the two-way interactions AxC and CxE, respectively. The AxC interaction may be interpreted as showing that, regardless of sex, spontaneous subjects see their work as more "active" than do divergent subjects (a fact also shown by the significant main effect on factor C); but males classed as spontaneous and divergent are close to each other in their activity ratings, whereas female spontaneous subjects see much more activity in their drawings than do female divergent subjects. The CxE interaction supports a trend seen in means on the main dependent variables in which there is an association between more process feedback and spontaneity while the converse is true for divergency. Thus, in this interaction, spontaneous subjects with more process feedback perceive their drawings as more active, whereas divergent subjects with less feedback see more activity in their drawings.

An interesting interaction occurs between the two treatment factors, D and E, further supporting general trends of Experiment I. This interaction takes place when gain scores between weeks C, D, and E are plotted on the Osgood Activity Scales. Figure 47, Appendix A, page 127, shows the nature of this interaction. When working from the still-life (D-1) with less process feedback (E-2), subjects maintained their evaluative level, whereas they showed great loss under more feedback. In working from mind (D-2), however, with more process feedback (E-1), gain was seen, whereas the converse occurred with less feedback. Figure 23, Appendix A, page 115, summarizes in bar graph form most of the above described differences occurring on self-ratings using the Osgood dimensions.

Table VII

Experiment I: Influence of Stimulus Set (Factor D) on the Eighteen Strategy (Style) Criteria

Criterion Number	Strategy Direction	Treatment minus Pre	Transfer minus Treatment	Still-Life Total	Mind Total	Stimulus Set Separation
1	S	(D-1) -.09 (D-2) +.20	+.16 -.13	-.22*	+.36	.58**
2	D	(D-1) .00 (D-2) -.05	-.26 +.14	+.14	-.31	.45
3	S	(D-1) +.04 (D-2) +.08	+.07 -.05	-.01	+.15	.16
4	D	(D-1) +.04 (D-2) -.10	-.33 +.06	+.10	-.43	.53
5	D	(D-1) +.10 (D-2) +.12	-.11 -.07	+.03	+.01	.02
6	S	(D-1) +.07 (D-2) +.13	+.10 -.15	-.08	+.23	.31
7	S	(D-1) -.10 (D-2) +.16	+.27 -.18	-.28	+.43	.71
8	D	(D-1) +.04 (D-2) +.09	-.09 +.14	+.18	.00	.18
9	S	(D-1) -.11 (D-2) +.06	+.27 -.19	-.30	+.33	.63
10	D	(D-1) +.18 (D-2) -.03	-.23 +.25	+.46	-.26	.72
11	D	(D-1) +.13 (D-2) +.01	-.35 +.15	+.28	-.34	.62

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*Note that the totals are obtained by combining diagonals, thus (-.09) + (-.13) = -.22 and (+.20) + (+.16) = +.36. This is because Stimulus Set conditions are reversed from Treatment during Transfer Period.

**Obtained by subtracting the one Stimulus Set from the other and disregarding the sign.

Criterion Number	Strategy Direction	Treatment minus Pre	Transfer minus Treatment	Still-Life Total	Mind Total	Stimulus Set Separation
12	S	(D-1) -.07 (D-2) +.01	+.20 -.20	-.27	+.21	.48
13	S	(D-1) .00 (D-2) +.08	+.21 -.20	-.20	+.29	.49
14	D	(D-1) +.05 (D-2) +.08	-.08 +.08	+.13	.00	.13
15	S	(D-1) -.13 (D-2) +.02	+.29 -.12	-.25	+.31	.56
16	D	(D-1) +.07 (D-2) -.29	-.25 +.29	+.36	-.54	.90
17	D	(D-1) +.15 (D-2) +.08	+.01 -.09	+.06	+.09	.03
18	S	(D-1) -.05 (D-2) +.13	+.19 -.20	-.25	+.32	.57
		Total for 9 S criteria		-1.86	+2.63	4.49
		Total for 9 D criteria		+1.74	-1.78	3.52

Table VIII

Experiment I: Summary of Analyses of Variance for Self-Ratings of Drawings on Osgood Scales for Treatment Periods
N=32

Source of Variation	Direction	Evaluative Scales		Activity Scales		Potency Scales	
		F-Ratio	Probability	F-Ratio	Probability	F-Ratio	Probability
A	A-1>A-2	-----	-----	3.363	.10	-----	-----
B	B-1>B-2	4.026	.10	-----	-----	-----	-----
C	C-1>C-2	6.685	.05	14.269	.01	-----	-----
D	-----	-----	-----	-----	-----	-----	-----
E	-----	-----	-----	-----	-----	-----	-----
AB	-----	5.045	.10	-----	-----	-----	-----
AC	-----	-----	-----	11.261	.025	-----	-----
BC	-----	5.503	.10	-----	-----	-----	-----
BD	-----	-----	-----	5.859	.10	-----	-----
CE	-----	-----	-----	7.168	.05	-----	-----
ABE	-----	5.884	.10	-----	-----	-----	-----
BCE	-----	-----	-----	5.683	.10	-----	-----
CDE	-----	-----	-----	14.408	.01	-----	-----

No other interactions were significant.

See Table I for factor names and subclass N's, p. 19.

Figure 24, Appendix A, page 115, summarizes in bar graph form differences between classification factor groups on picture format choices, defined simply as the number of vertical or horizontal drawings which subjects made. Table XXIX, Appendix A, page 109, reports the analysis of variance results on the sum of horizontal picture format choices. Table XXX, Appendix A, page 110, does the same for sum of vertical picture format choices. Looking at results on the classification factors only (since sum of pictures of a particular format is the dependent variable and, as such, cuts across all seven weeks of the experiment), four main effects occur in these two tables and they are free of interactions (with other classification factors). Males made significantly more horizontal pictures than did females, and, conversely, females chose the vertical format significantly more often than males. Art subjects classified as spontaneous also chose vertical format significantly more often than their counterparts.

Several other descriptive analyses of variance were performed which may further help to clarify what took place in Experiment I. Figure 45, Appendix A, page 136, shows a difference in subject's perception of their own drawings which appears to relate to treatment factor D (implicit set: still-life or mind) and classification factor B (art or non-art), where the dependent variables is the amount of flexibility the subject perceives in his own process stages (assigned to his time-lapse records of his drawings according to the form found in Appendix C, page 179). Interpretation suggests that art subjects perceive more flexibility in their process stages when working from the still-life, whereas the opposite is true for non-art subjects.

Figure 48, Appendix A, page 127, indicates a difference in subgroups of the sample prior to treatment periods. Using an index called S% (per cent of spontaneous drawings) at pre (weeks A and B combined), art subjects, regardless of sex, are more spontaneous than non-art at the start, but males differ greatly on the training factor in S% (43%) whereas females are closer (only 13% apart).

Additional Descriptive Data

Figure 22, Appendix A, page 114, summarizes in bar graph form differences occurring on total S% (of drawings) for the three classification factors. As might be expected, and as other analyses also bear out (see Figures 26 and 27, Appendix A, pages 116 and 117), art subjects and those classified as spontaneous did produce significantly more drawings judged to be spontaneous in style than did their counterparts.

Several analyses were performed which involved drawing time (in minutes). Figure 21, Appendix A, page 114, summarizes some of the differences found during pre, treatment, and transfer periods on drawing time. In all three periods, non-art subjects spent more time on their drawings. Subjects classed as spontaneous spent less time on drawings during the treatment period. In the transfer period, however, this same trend continued only for the art subjects; for some reason, non-art spontaneous subjects took more time then than did non-art divergent subjects.

The effect of treatment factor D (implicit set: still-life or mind) is best seen by reference to Figure 46, Appendix A, page 126. A strong effect occurs in treatment period, where those working from the still-life take more time on their drawings than at pre, while the opposite occurs with those working consistently from their minds (a loss in time from pre). During transfer period, however, the difference in drawing time built up over the three treatment weeks generally persists, even though stimulus conditions are then reversed.

Relationships among Dependent Variables

Tables XXXIV and XXXVI, Appendix A, pages 130 and 131, report several kinds of relationships between dependent variables and certain experimental and extra-experimental conditions. Leaving out period seven, in which conscious style manipulation was encouraged, Table XXXIV clearly demonstrates the significant positive connection between aesthetic quality and the spontaneous strategy score, and aesthetic quality and amount of art experience (quantified by the system developed by Burgart, 11). A corresponding significant negative correlation is shown between the art experience index and the total divergent score. Partial correlations holding the art experience index constant do little to remove the fairly strong positive relationship existing between spontaneity and aesthetic quality, and the negative one between divergency and aesthetic quality in this sample.

Table XXXVI shows some rather spectacular changes in the relationship between aesthetic quality and strategy scores which occurred during the first part of period seven, when subjects were asked to simulate, after brief training in recognizing strategies, the opposite of the strategy they perceived they typically used. A shift of + .769 occurs in the relationship between divergent strategy and aesthetic quality, comparing the relationship obtained in the first six periods with that of the simulation drawing. There is here the suggestion that the high association reported earlier between spontaneous strategy scores and aesthetic quality is attributable to the fact that the better students (in art, in art background) exercised stylistic choice favoring spontaneity, and that when they simulated the opposed style, it also correlated positively with quality. The converse is true, to a lesser degree, of the simulated spontaneous style. Yet there is still a relatively high correlation between aesthetic quality of the first six periods and aesthetic quality of the switch drawing (.605), although the relationship between aesthetic quality of the first six periods and aesthetic quality of drawings done subsequent to the switch drawing (post), shows an increase of .253 (or from .605 to .858).

The high negative correlation (-.759) occurring between the spontaneous strategy score and the divergent strategy score for the first six periods (combined), suggests how nearly bipolar the two strategies appear to be, in action and in judging them. It is also apparent that a fair degree of stability in strategy is being revealed, even as the paragraph above gives evidence that aesthetic quality persists as consistent throughout all periods of the study.

Stability of Strategy Classification

Apart from the switch period, when subjects simulated what they perceived to be a style opposed to their own, strategy would appear to remain relatively stable according to the evidence presented so far. Table XXXVII, Appendix A, page 132, indicates that 71% of the subjects retained their original strategy classification, when change is defined on the criterion of total output (determined by total number of drawings judged to be more in one strategy than the other). The greatest error falls in the cell in which are found the art subjects originally classed as divergent. Five out of eight of these must be counted spontaneous on the basis of their total output. In contrast, four out of ten non-art subjects originally judged to be spontaneous end up being divergent. It was this bias in classification that led to more thorough screening of subjects prior to Experiment II.

When the same criterion is used for final strategy grouping as above (called "total S%" in the tables), subjects' self-ratings of their strategies at the beginning of week G, with minimal instruction, are as accurate as their original classification, or slightly more so. Tables XXXIX and XL, Appendix A, page 133, summarize the data on self-rating.

Of special interest in discussing the implicit set toward one or the other strategy created by drawing stimulus conditions, is the choice of stimulus by subjects for simulating perceived opposite strategy at the start of week G. Table XXXVIII, Appendix A, page 132, summarizes these choices. There is a significant departure from chance in choice patterns. Nearly two-thirds of those classified as spontaneous chose the still-life to simulate the opposed style, whereas four-fifths of those classified as divergent chose to draw from the mind. Thus in their choice of stimulus conditions for switching strategy, subjects gravitated to the stimulus condition inclined to reinforce the strategy they were trying to achieve.

Figures 49, 50, 51, and 52, Appendix A, pages 128 and 129, graphically illustrate the variability of style of typical art and non-art subjects during the experiment. Figures 49 and 50 show the typical patterns of art subjects. Figure 49 is the more typical of the two, since it shows the characteristic strategy deflections found with changing stimulus conditions during the treatment and transfer periods. Figure 51 illustrates the comparative changelessness found among non-art subjects. Figure 52 gives an extreme example of variability. This subject changed strategy classification during every time period of the experiment. In most cases among art subjects, actual strategy change (as to dominance) occurred during switch period. Typically, such a change did not even occur then, among non-art subjects.

Figures 7, 8, 9, and 10, pages 40 to 43, present drawings illustrating style variability. Figure 7 and 8 each contain sequences of three drawings which illustrate strategy deflection which is associated with the implicit set created by changing stimulus conditions. Figures 9 and 10 each contrast "before" and "after" examples showing strategy change occurring on the "switch" drawing, on which subjects were asked to simulate the strategy they perceived to be opposite to their typical way of working.

II. Structure of the Detailed Art Strategy Criteria

Once all of the drawing sequences from Experiment I had been judged on the 18 detailed strategy criteria presented before in Table II, page 19, the 18 criteria were submitted to a principal components factor analysis. Six factors were extracted, accounting for 89.2% of the total variance of the matrix. The results of this analysis, in the form of a varimax rotation, are given in Table IX, page 44.

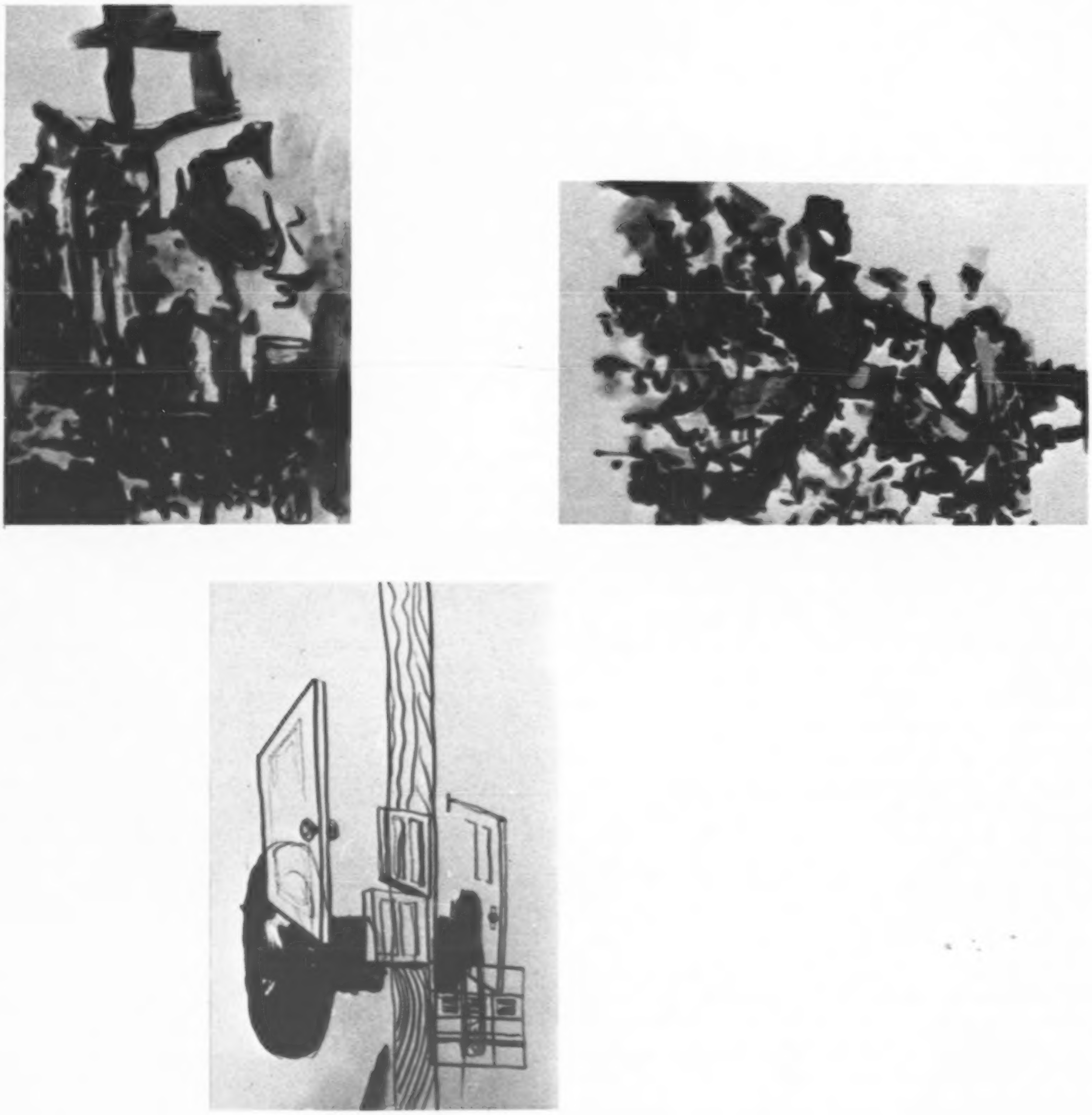


Figure 7: Experiment I: Sequence of Three Drawings by a Spontaneous Subject Showing Strategy Deflection Associated with Changing Stimulus Conditions

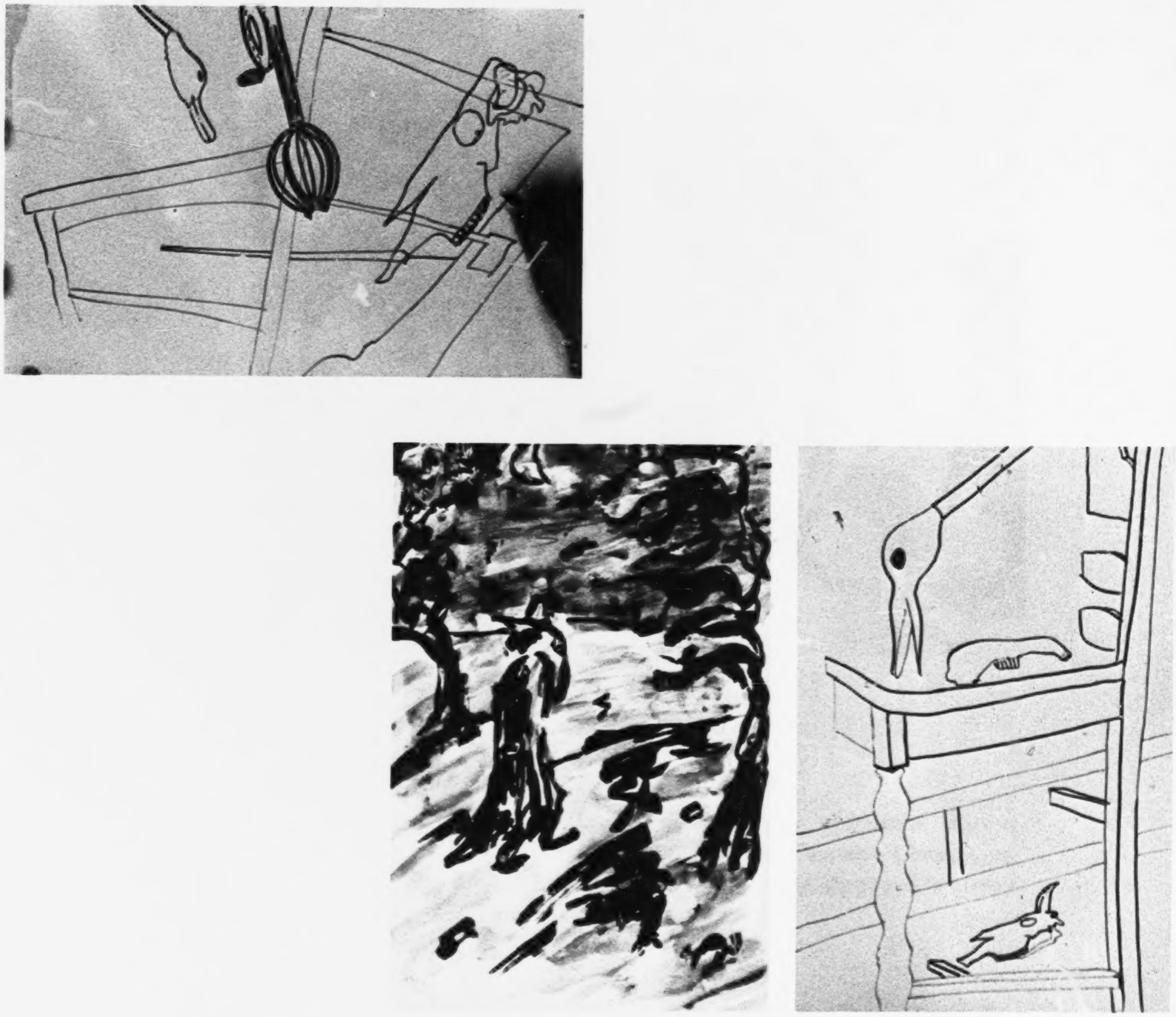


Figure 8: Experiment I: Sequence of Three Drawings by a Divergent Subject Showing Strategy Deflection Associated with Changing Stimulus Conditions

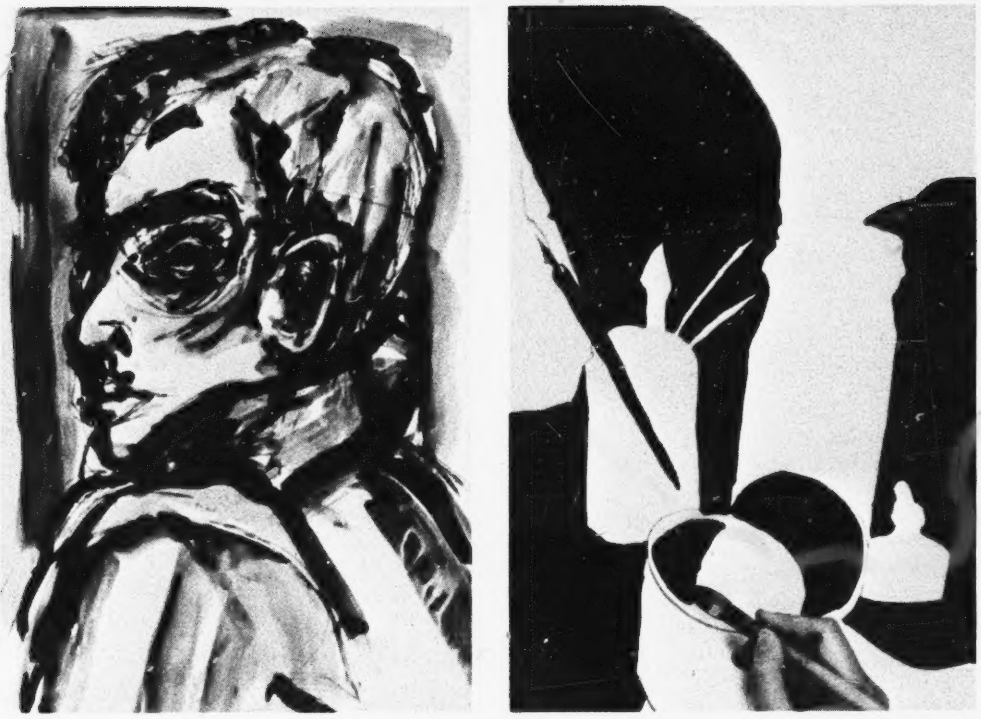


Figure 9: Experiment I: Two Drawings by a Spontaneous Subject Showing Strategy Change on "Switch" (Simulation of Perceived Opposed Strategy in Period 7)

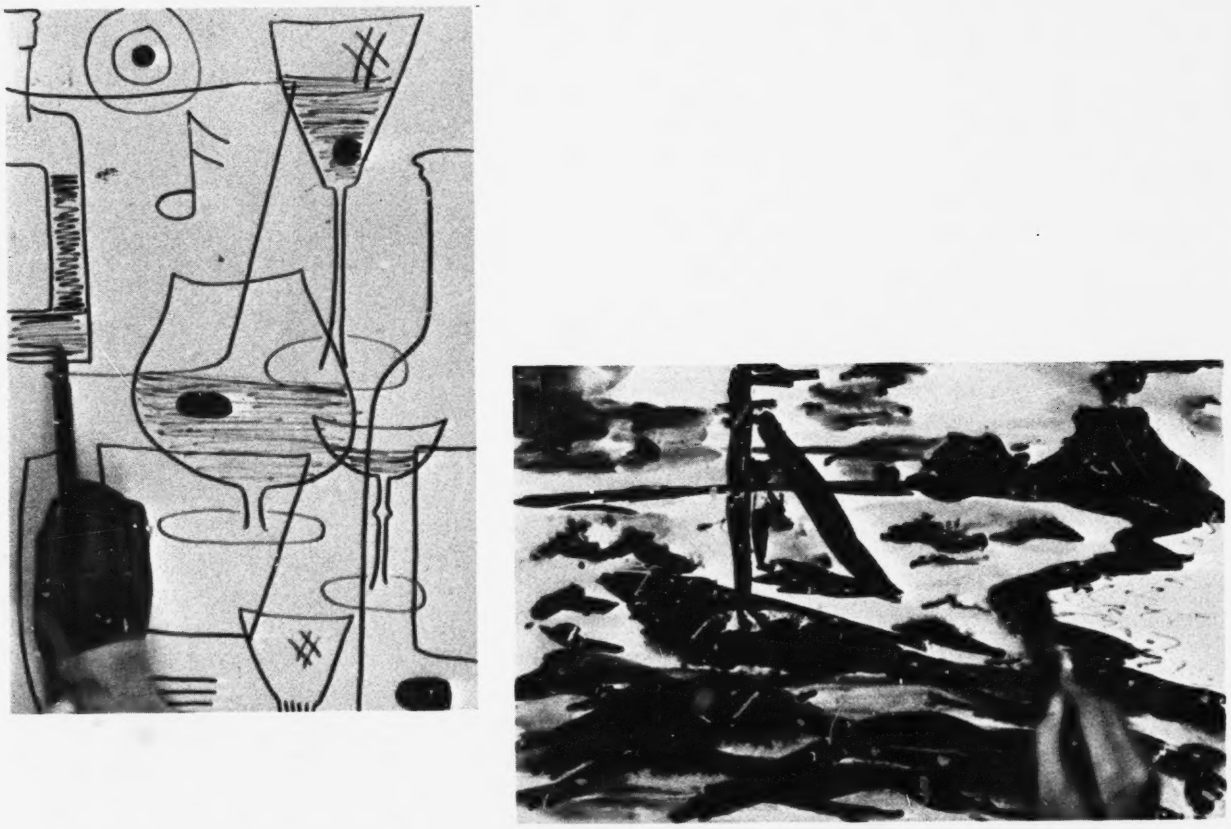


Figure 10: Experiment I: Two Drawings by a Divergent Subject Showing Strategy Change on "Switch" (Simulation of Perceived Opposed Strategy in Period 7)

Table IX

Experiment I: Varimax Rotation of the Eighteen Strategy Criteria

	F 1 (S)	F 2 (D)	F 3 (D)	F 4 (S&D)	F 5 (S)	F 6 (D)
1	0.70806	-0.17604	-0.09023	0.24581	0.43717	-0.31877
2	-0.51879	0.16533	0.04386	-0.44689	-0.36298	0.52628
3	0.33309	-0.06920	-0.14402	* 0.83662	0.23210	0.01673
4	-0.49587	0.13538	0.18164	-0.70869	-0.15171	0.28985
5	-0.15967	0.17510	* 0.92357	-0.21054	-0.10888	0.28985
6	0.45974	-0.18903	-0.17468	0.45827	0.60543	-0.20564
7	* 0.86417	-0.11543	-0.08843	0.28210	0.23766	-0.13303
8	-0.30591	0.50670	0.22028	-0.07973	-0.21601	* 0.64526
9	0.85905	-0.17092	-0.15652	0.24095	0.16648	-0.17331
10	-0.39164	0.61268	0.19089	-0.31000	-0.24449	0.41369
11	-0.24542	0.58905	0.09395	-0.22032	-0.49584	0.40323
12	0.41360	-0.23010	-0.11339	0.24737	* 0.78479	-0.09455
13	0.56966	-0.16473	-0.02219	0.20312	0.67730	-0.25098
14	-0.24431	0.58219	0.30320	0.09719	-0.44088	0.37253
15	0.76675	-0.21637	-0.10931	0.23786	0.44621	-0.06009
16	-0.08304	* 0.88510	0.01119	-0.22148	-0.11443	0.03527
17	-0.09114	0.87593	0.09829	0.04765	-0.06028	0.07841
18	0.60391	-0.23181	-0.17776	0.46740	0.46261	-0.17373

*Designates highest loading on a factor
Underscoring designates highest loading on each criterion

89.2% of variance accounted for by six factors
For names of the criteria (in the same number sequence) see page 21.

While the researcher felt there was an apparent logic in the clustering of the criteria on the various factors, as Table XLI, Appendix A, page 134, indicates, the independence of the factors left something to be desired. (Note that the factor numbers and the signs found in Table XLI must be referred back to Table IX.) Except for factor 4, however, which deals primarily with criteria designating how a drawing is begun or attacked (criteria 3 and 4, see Table II), the factors are not bipolar. There is still some argument, therefore, that the strategies should be judged independently of each other where the detailed criteria are concerned, and not on bipolar continua, even though on total scores the two strategies are highly negatively related.

Using the results of the factor analysis as a guide, six clusters of criteria, three clusters in each strategy, were designated and named. These will be referred to as SI, SII, and SIII; DI, DII, and DIII, respectively. Their names and the criteria under each are given in Table IV, page 26. Table XXXV, Appendix A, shows how these latter strategy criteria factors related to Burgart's Art Experience Index for subjects in Experiment I. It will be noted that DF-I is most highly negatively correlated with Art Experience.

Figures 11 through 16, pages 46 to 51, present drawings illustrating the six strategy factors (hereafter where strategy factors are mentioned they may be taken to refer to those presented in Table IV). It should be kept in mind in looking at these examples that, within a strategy, the factors are highly intercorrelated. In Experiment II, for example, the three spontaneous factors intercorrelate, on the average, .853; and the divergent, .845 (see Table LXXI, Appendix B, page 173).

III. Experiment II

Reliability of Judgments

Table XLII, Appendix B, page 136, summarizes reliability estimates for three trained art judges (two new graduate research assistants, both doctoral students, who had no involvement in either Experiment I or II, and the researcher), on the six strategy criteria factors, judged from the process series strips, and on aesthetic quality, judged from the finished drawings themselves. As mentioned previously, strategy judgments were made across whatever drawings were produced in each one hour, weekly meeting. Thus six folders were judged for each subject. Each judge worked independently, as mentioned previously, and the order of judgements was varied. All in all, approximately 5,000 judgments were required, but this was a considerable saving in time and energy over the number of judgments made following Experiment I.

Using the figures appearing in column three of Table XLII (derived from the formula based on number of raters and average inter-judge agreement, as indicated at the bottom of the Table) as the fairest estimate of reliability, coefficients vary between .887 and .962, averaging .918, for the six strategy criteria factors. The coefficient for aesthetic quality is .905.

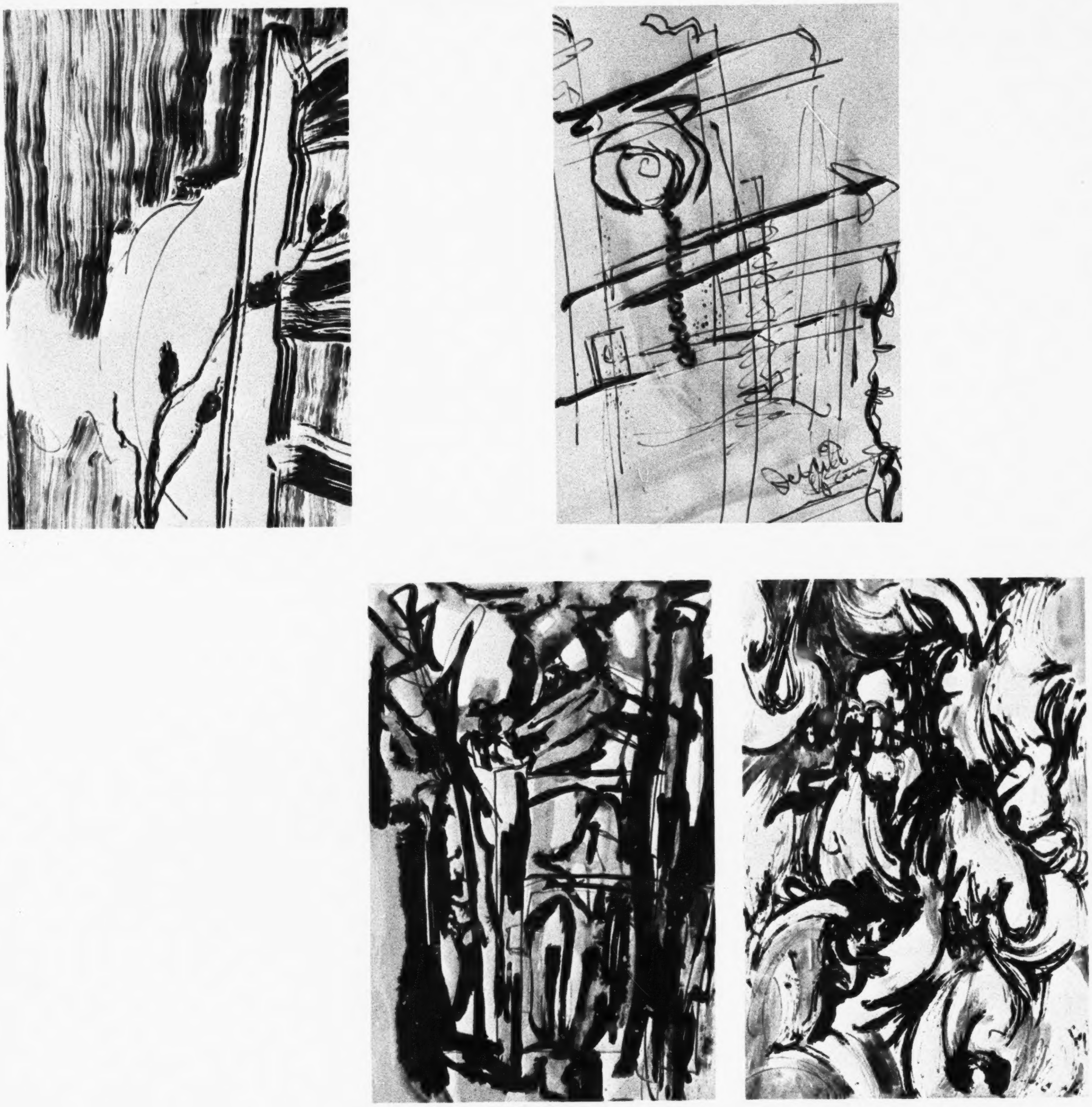


Figure 11: Drawings Illustrating Strategy Criteria Factor S-1, Process Dialogue

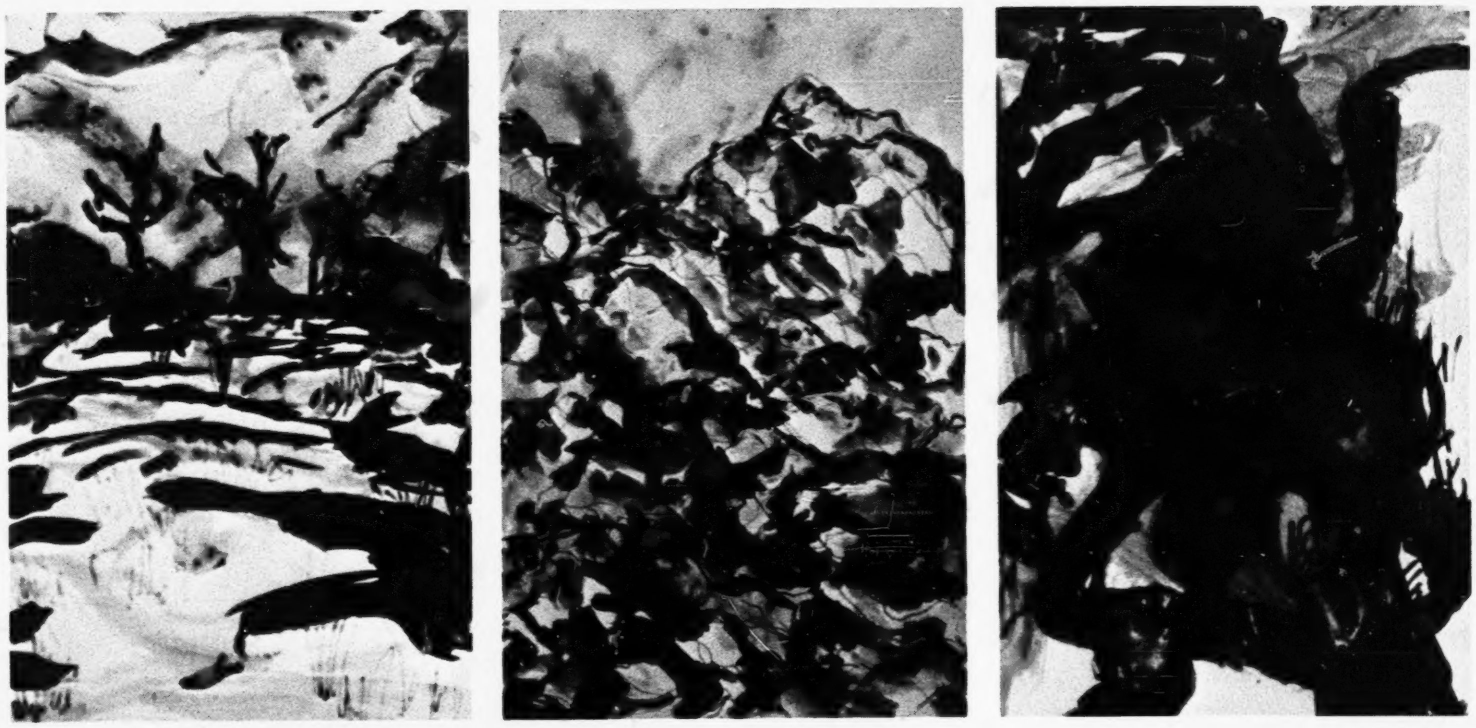


Figure 12: Drawings Illustrating Strategy Criteria Factor S-II, Spatial Continuity

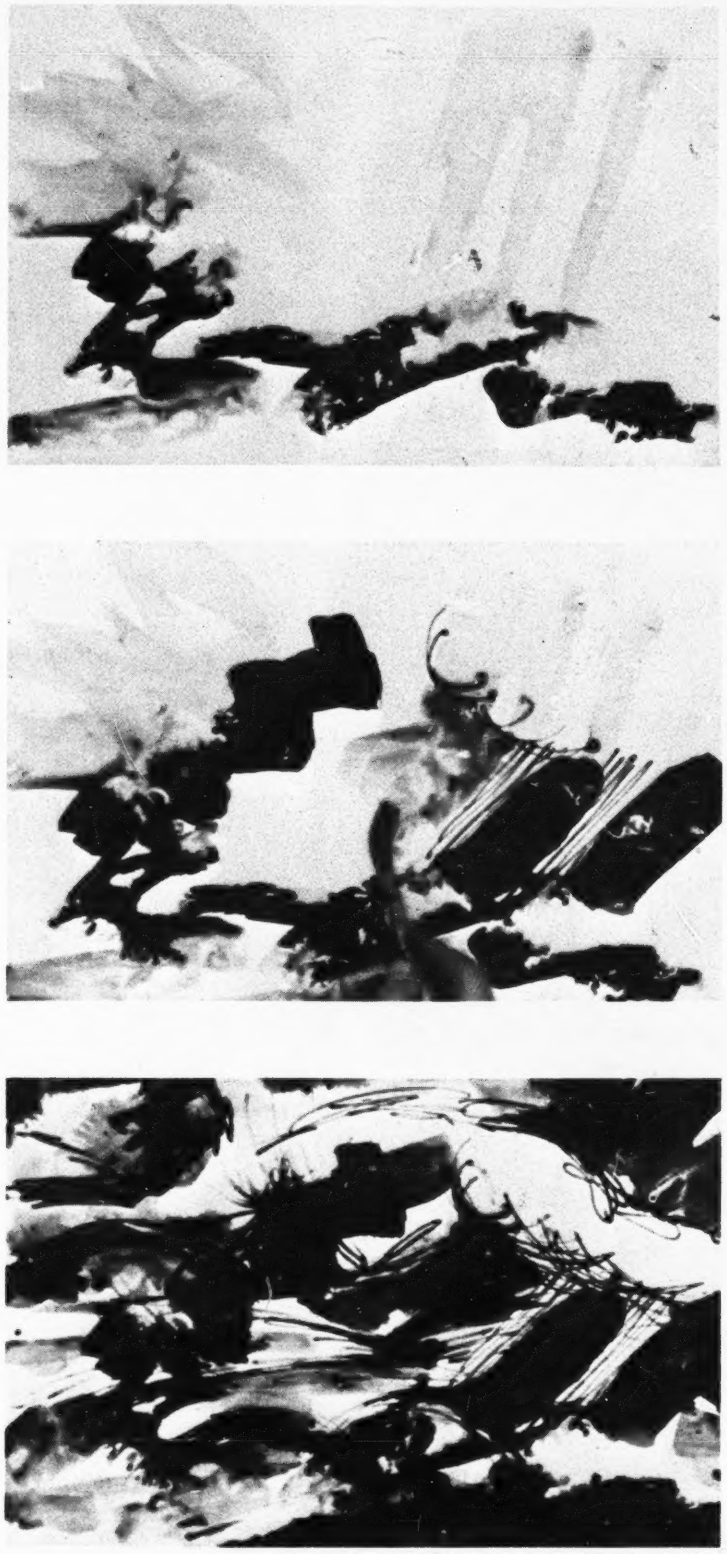


Figure 13: Drawings Illustrating Strategy Criteria Factor S-III, Big Central Attack

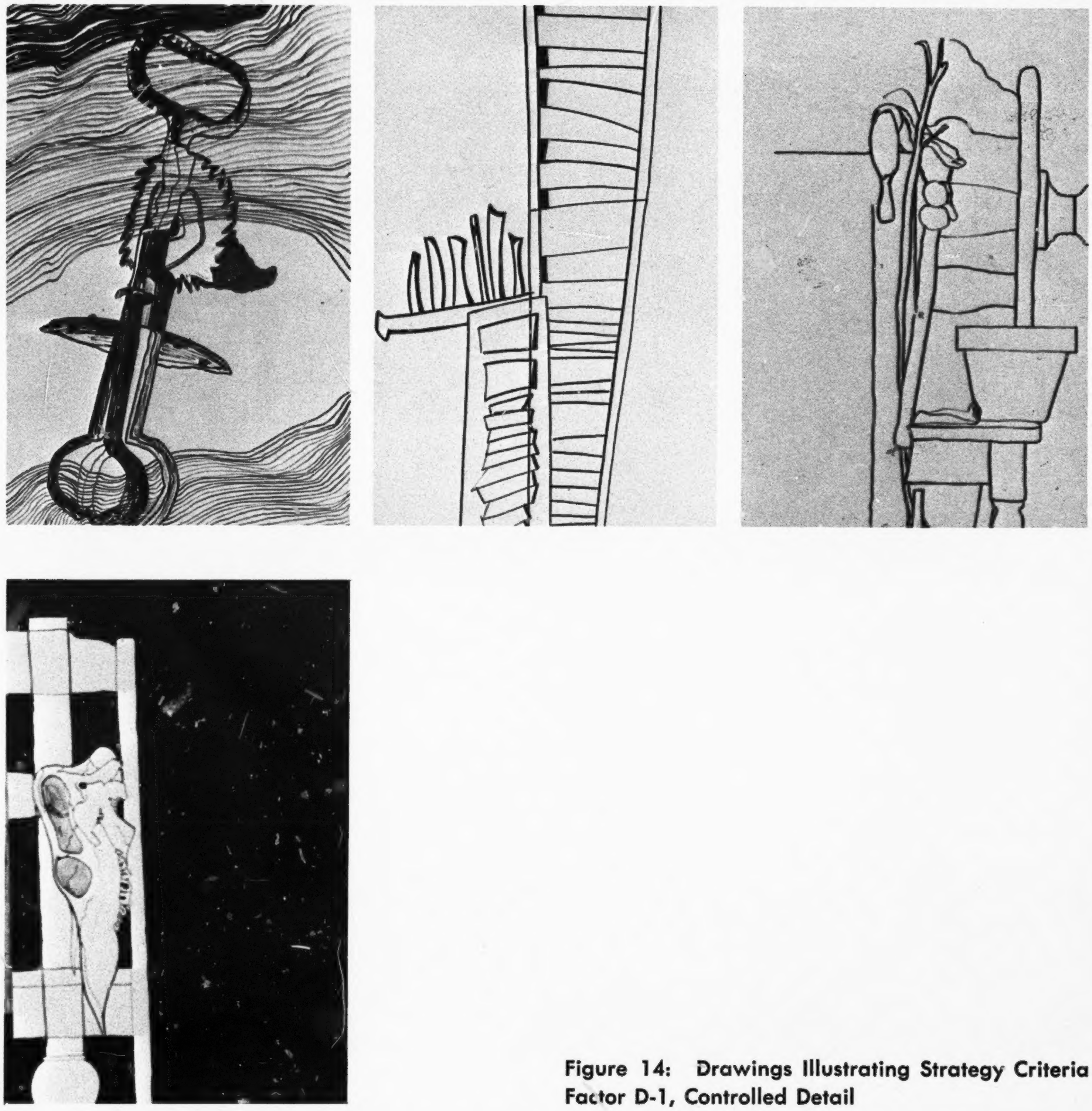


Figure 14: Drawings Illustrating Strategy Criteria Factor D-1, Controlled Detail

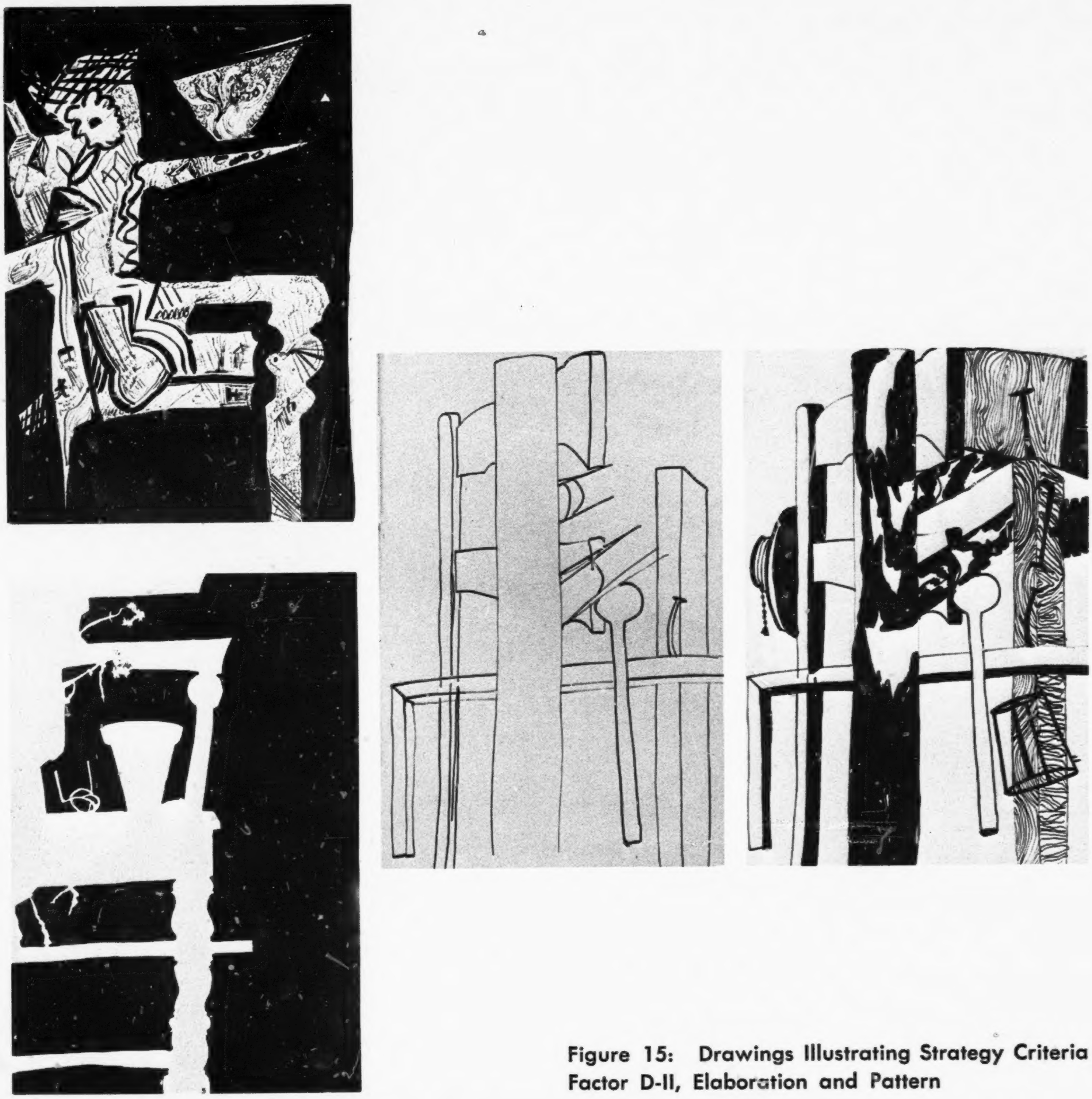


Figure 15: Drawings Illustrating Strategy Criteria Factor D-II, Elaboration and Pattern

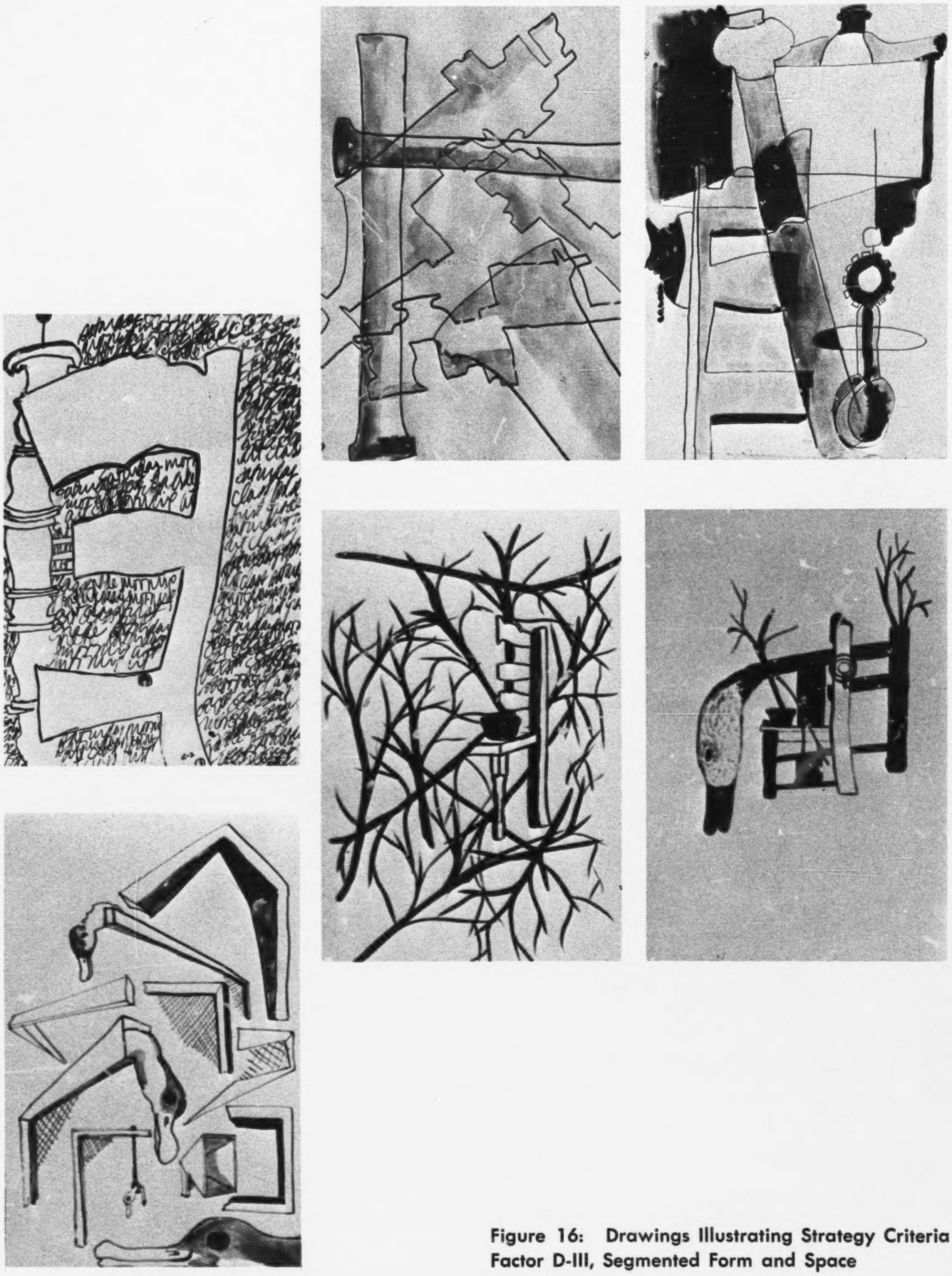


Figure 16: Drawings Illustrating Strategy Criteria Factor D-III, Segmented Form and Space

Analyses of Variance: Main Dependent Variables

Table X, page 53, summarizes the analyses of variance for treatment period gains on spontaneity total, divergent total, and aesthetic quality. Tables XLIII, XLV, and XLVII, Appendix B, pages 137, 139, and 141, give complete figures for the analyses of variance summarized in Table X.

Four main effects are significant in Table X. Two of these occur on the spontaneity total. On factor C, strategy classification, subjects classed as divergent are gaining in spontaneity significantly over those originally classed as spontaneous. On factor D, a treatment factor, a very high F-ratio shows that stylistic instruction oriented toward the spontaneous strategy or style brought about highly significant change on the spontaneity total. There are no other significant F-ratios on the spontaneity total either on main effects or interactions.

On the divergent total, the same significance pattern is found. On factor C, strategy classification, subjects originally labelled as spontaneous gain significantly on divergency as compared with those classified as divergent. On treatment factor D, instruction toward the divergent style significantly causes gains on the divergency total. Again there are no other significant F-ratios, main effects or interactions. No significant F-ratios appear at all under aesthetic quality.

Table XI, page 54, summarizes the analyses of variance for post gains on spontaneity total, divergency total, and aesthetic quality. Tables XLIV, XLVI, and XLVIII, Appendix B, pages 138, 140, and 142, give complete figures for the analyses of variance summarized in Table XI.

Two significant main effects may be observed in Table XI. On the spontaneity total, treatment factor D has a continuing effect, in that stylistic instruction in the spontaneous strategy persists into the post treatment period. A like effect, even stronger, occurs on the divergency total, where the effect of stylistic instruction toward divergency also persists into the post treatment period. These two main effects can be interpreted unambiguously, since there are no significant interactions.

On aesthetic quality there are no significant main effects, but two interactions, each involving classification factors, are significant. An AxB interaction (see Figure 69, Appendix B, page 175), shows that for male subjects the art majors are gaining significantly, whereas for female subjects it is the non-art majors who are gaining in aesthetic quality in post period. (In general, female subjects show greater gains in aesthetic quality in this period, P= .10.)

There is also an AxC interaction, shown graphically in Figure 70, Appendix B, page 175a. In this case, male divergent subjects are gaining over male spontaneous subjects, whereas there is little difference between female subjects when classed by strategy, but what there is favors the spontaneous. (In general, however, divergent subjects are making greater gains in aesthetic quality in this period, but the difference is not significant.)

Further and more detailed analyses of variance covering treatment gains and post gains for each of the six criteria factor clusters will be found in Appendix B, Tables XLIX through LX, pages 143 through 154.

Table X

Experiment II: Summary of Analyses of Variance
for Treatment Gains on Spontaneity Total,
Divergency Total, and Aesthetic Quality
N=32

Source of Variation	Direction	Spontaneity Total F-Ratio	Spontaneity Total Probability	Divergency Total F-Ratio	Divergency Total Probability	Aesthetic Quality F-Ratio	Aesthetic Quality Probability
A	-----	-----	-----	-----	-----	-----	-----
B	-----	-----	-----	-----	-----	-----	-----
C	C-2>C-1	8.689	.05	-----	-----	-----	-----
C	C-1>C-2	-----	-----	8.988	.025	-----	-----
D	D-1>D-2	67.920	.005	-----	-----	-----	-----
D	D-2>D-1	-----	-----	48.353	.005	-----	-----
E	-----	-----	-----	-----	-----	-----	-----

No interactions were significant for these dependent variables.

See Table III for factor names and subclass N's, p. 25.

Table XI

Experiment II: Summary of Analyses of Variance for Post Gains on Spontaneity Total, Divergency Total, and Aesthetic Quality
N=32

Source of Variation	Direction	Spontaneity Total		Divergency Total		Aesthetic Quality	
		F-Ratio	Probability	F-Ratio	Probability	F-Ratio	Probability
A	A-2>A-1	-----	-----	-----	-----	4.723	.10
B	-----	-----	-----	-----	-----	-----	-----
C	-----	-----	-----	-----	-----	-----	-----
D	D-1>D-2	14.180	.01	-----	-----	-----	-----
D	D-2>D-1	-----	-----	30.877	.005	-----	-----
E	E-2>E-1	-----	-----	-----	-----	5.143	.10
AB	-----	-----	-----	-----	-----	13.661	.025
AC	-----	-----	-----	-----	-----	6.036	.05
ABC	-----	4.137	.10	-----	-----	-----	-----
ACD	-----	-----	-----	-----	-----	5.143	.10
BCD	-----	-----	-----	-----	-----	5.143	.10
CDE	-----	-----	-----	-----	-----	5.580	.10

No other interactions were significant.

See Table III for factor names and subclass N's, p. 25.

Back up data, in the form of means for main treatment groups, given by weeks, by experimental period groupings, and as gains or losses over the beginning base, are also given in Appendix B, in a series of Tables LXI through LXIX, pages 155 through 163. The first three of these tables present data for the spontaneous criteria total, the divergent criteria total, and aesthetic quality. Following these, data are given for each of the six criteria factors.

Dynamics of Experiment II may perhaps be grasped most clearly by reference to a series of figures which portray main treatment group means on the three key dependent variables over a time line (the three experimental periods: base, treatment, and post). For this material, see Figures 53 through 67, Appendix B, pages 164 through 171. Figure 68, Appendix B, page 171, shows the variation occurring on the grand means of the three key dependent variables for the three experimental periods.

Clear examples of the dynamics presented numerically and graphically above are given in pictorial form in Figures 17 through 20, pages 56 to 59. These examples each show a sequence of drawings running through the experiment which illustrate the impact of stylistic instruction. Examples are given for trained and untrained subjects (art, non-art) who were classified in the two strategies at the start of the experiment.

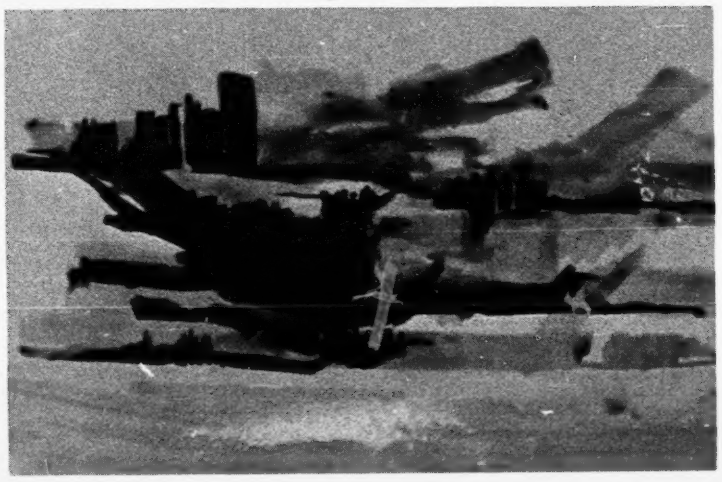
Analyses of Variance: Subsidiary (Descriptive) Dependent Variables

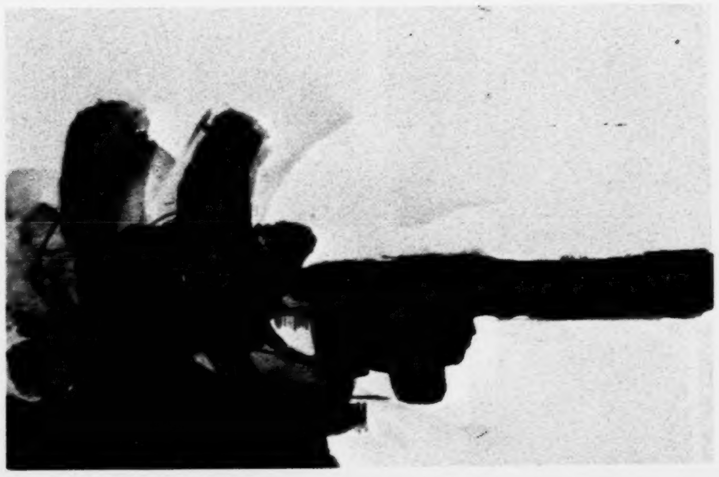
In Experiment II, concentration was focused largely on the main or key dependent variables. Experiment I was in itself more descriptive, hence many additional variables were surveyed there.

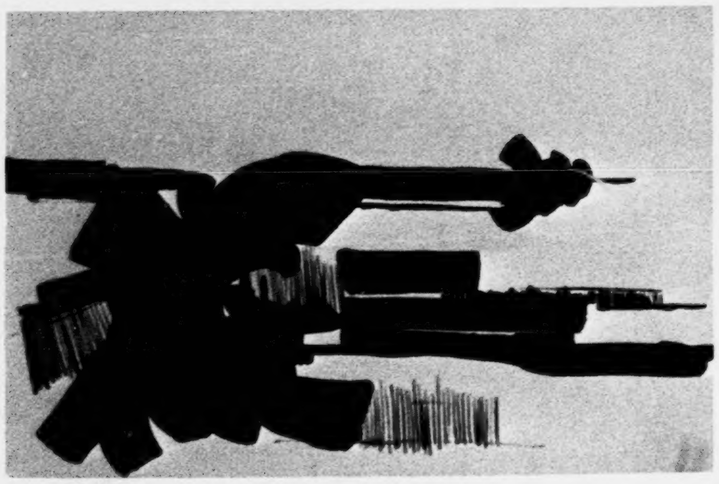
One question seemed worthy of pursuit, however, and that was the variation in drawing time which might be associated with treatment or classification factors. Since a standard time interval was used for in-process photographs, the number of photographs recorded was taken as equivalent to the drawing time score.

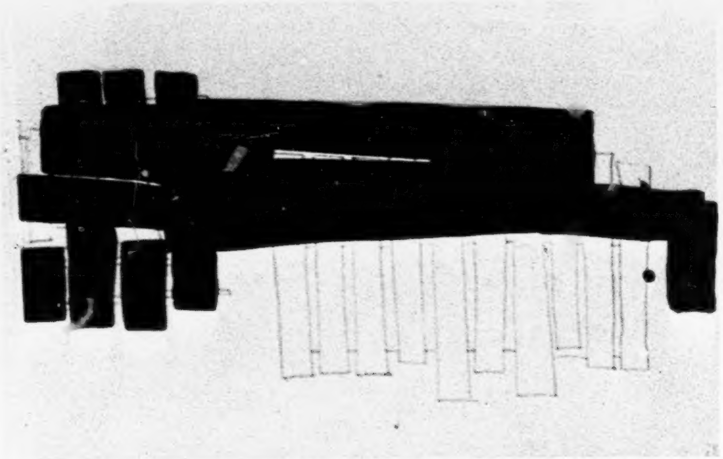
Tables LXXII and LXXIII give the data related to these analyses (see Appendix B, pages 175 and 175). Two main effects are seen in Table LXXII (one of these is just short of the .05 level). The first shows that spontaneous subjects (as classified) take significantly less time than do divergent subjects, at treatment period. The other main effect shows a persisting effect into post period, in which those receiving instruction in the spontaneous style take less time in drawing than those instructed in the divergent style. Table LXXIII gives means for several CxD interactions (non quite significant at the .05 level) and indicates that it was the spontaneous subjects receiving instruction in the spontaneous style who were most reactive in drawing time, exhibiting a decided loss in time spent on drawings for both treatment and post periods.

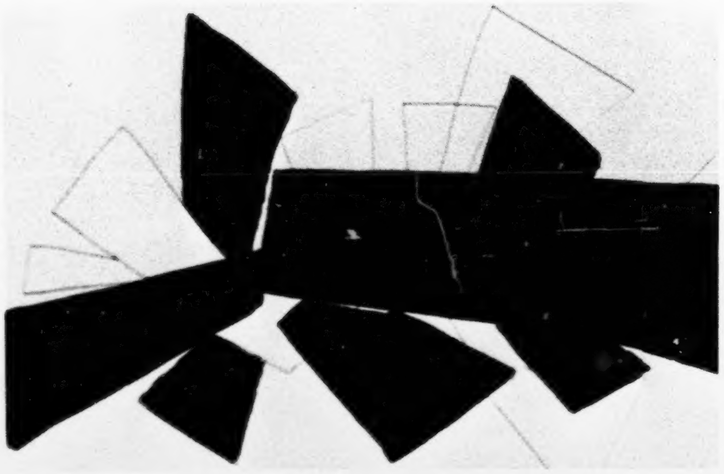
A brief summary of galvanic skin response (GSR) patterns associated with characteristics of the sample or with treatment conditions, as collected by a graduate research assistant during the last three weeks of Experiment II (weeks C, D, and E), is given in Appendix D, page 181.











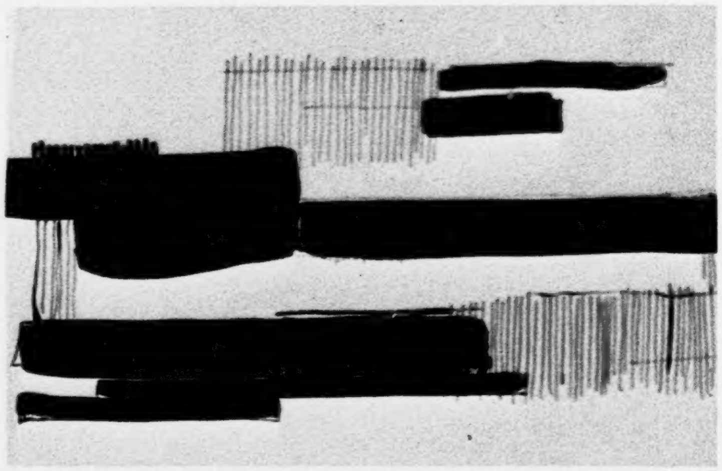


Figure 17: Experiment II: Drawings over Six Consecutive Weeks by a Spontaneous Art Major Instructed in the Divergent Style during the Treatment Period

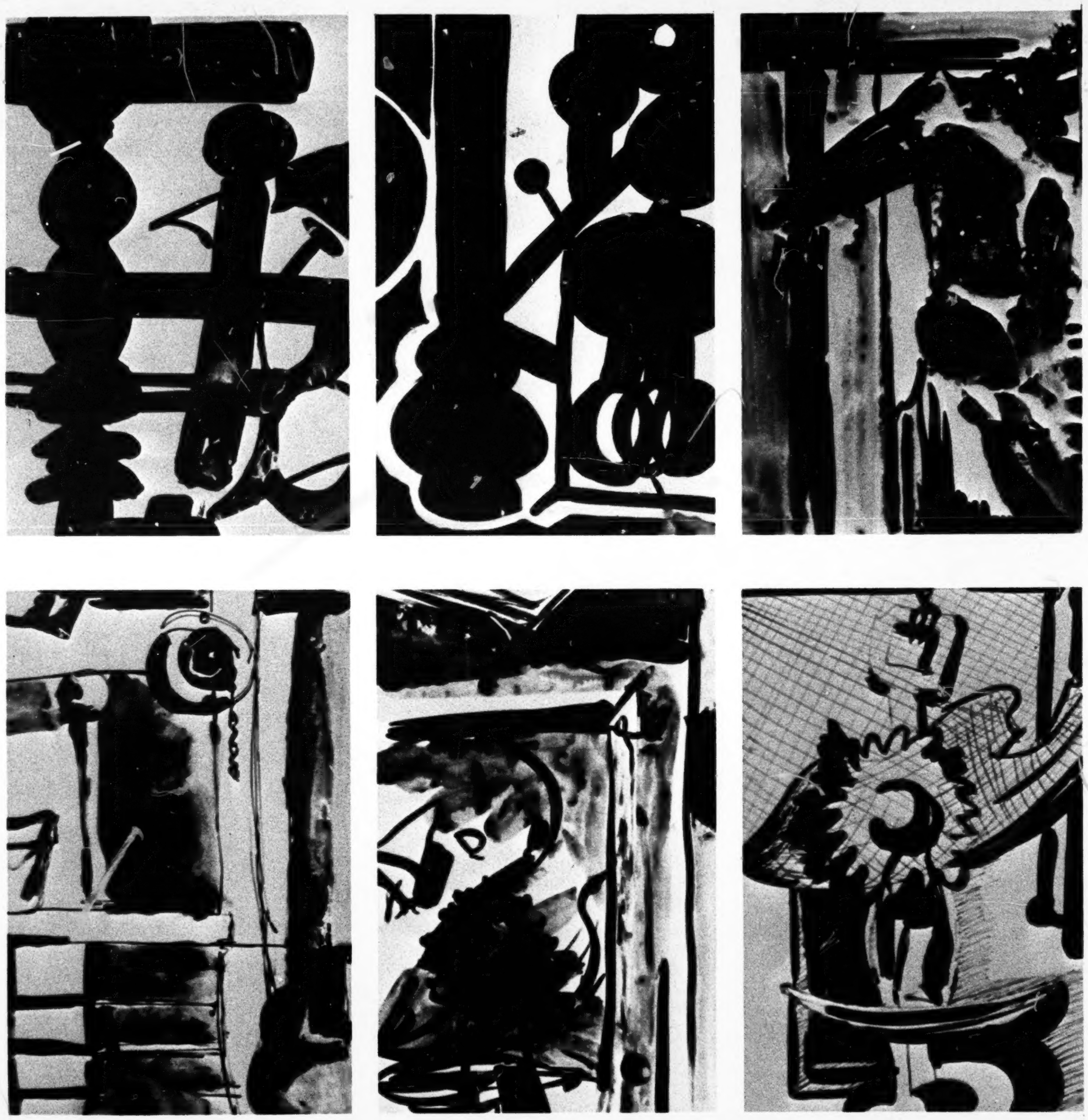


Figure 18: Experiment II: Drawings over Six Consecutive Weeks by a Divergent Art Major Instructed in the Spontaneous Style during the Treatment Period

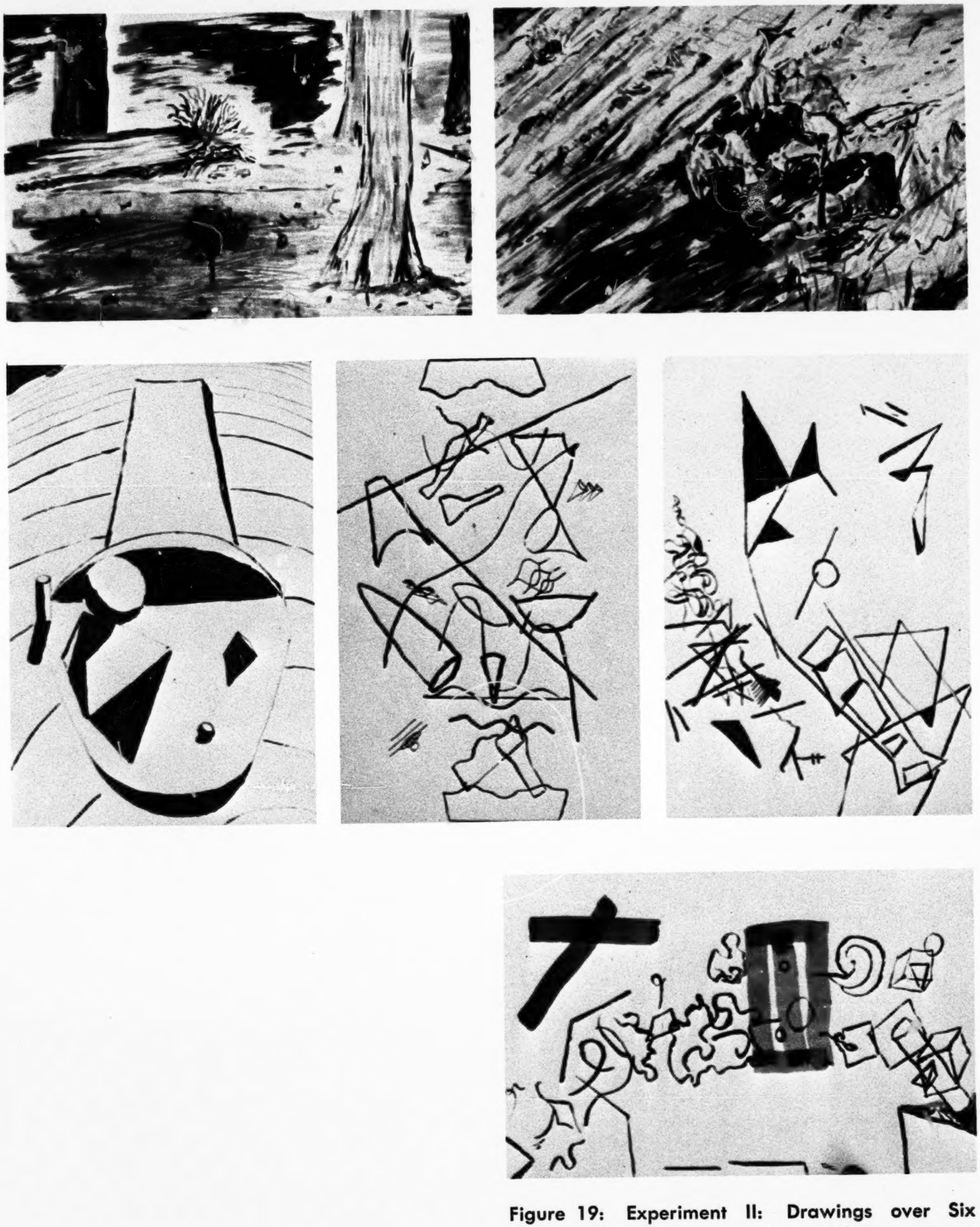


Figure 19: Experiment II: Drawings over Six Consecutive Weeks by an Untrained Spontaneous Subject Instructed in the Divergent Style during the Treatment Period

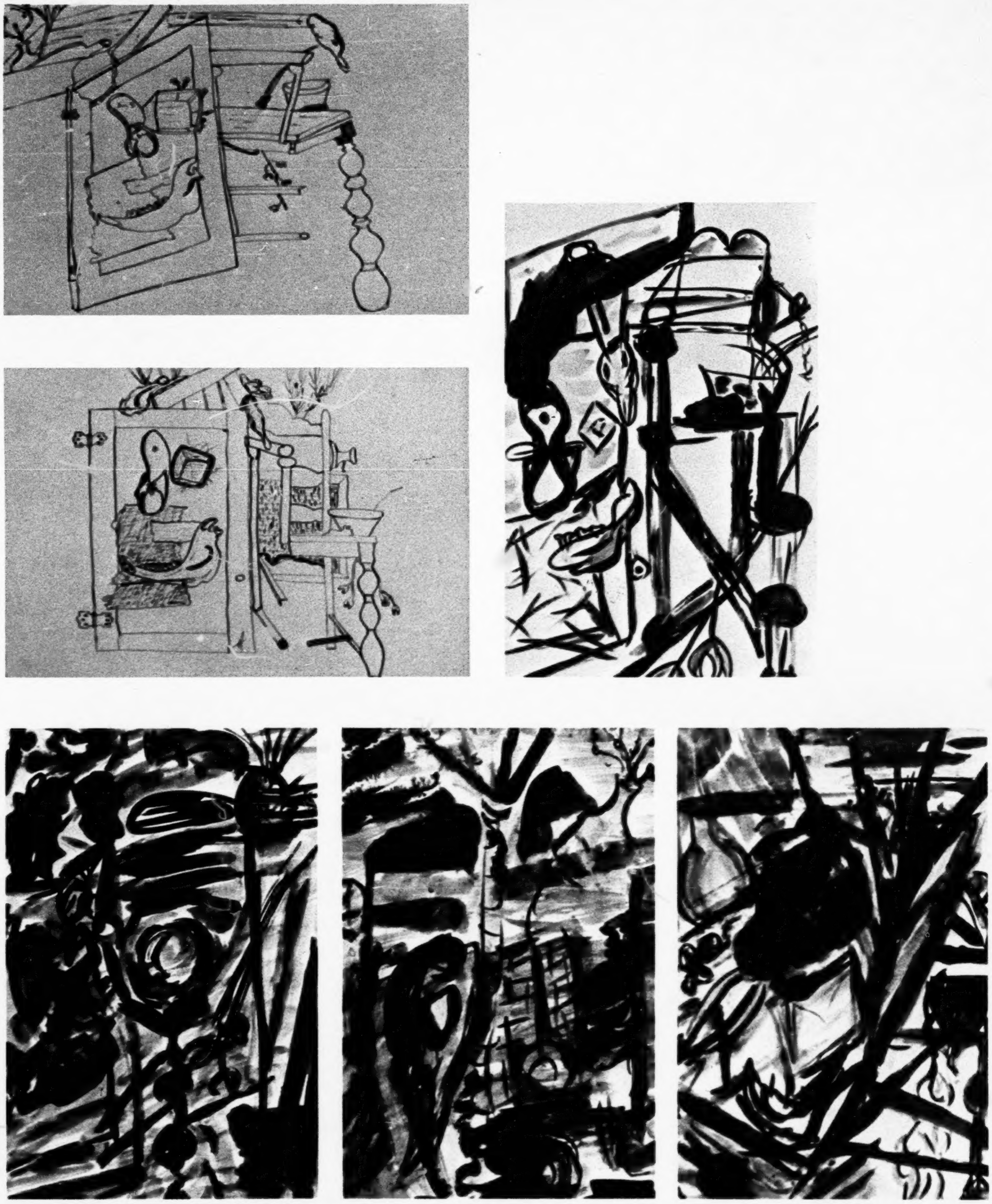


Figure 20: Experiment II: Drawings over Six Consecutive Weeks by an Untrained Divergent Subject Instructed in the Spontaneous Style during the Treatment Period

Relationships among Dependent Variables

Table LXX, Appendix B, page 172, is an intercorrelation matrix showing how each of the six criteria factors relate to each other and to aesthetic quality. The high intercorrelation of each of the three criteria factors within each strategy is shown, as well as the strong negative relationships with the opposite strategy. Possibly both because of better screening of subjects for strategy classification and because of treatment influences, the relationship between spontaneity and aesthetic quality, and divergency and aesthetic quality is much less biased than in experiment I. Table LXXI, however, suggests that some bias still persists, as indicated by the .289 relationship between spontaneity total at base period and aesthetic quality, as compared with the .069 between divergency total and aesthetic quality for the same period. Treatment conditions, however, appear to cancel this bias out, as the more talented students were then assigned to work in both styles.

Table LXXI also convincingly shows how art experience (Burgart's index) and aesthetic quality are highly intercorrelated (average = .768). The base relationship between this art experience index and spontaneity total is .319, somewhat higher than for aesthetic quality. Experience becomes less associated with strategy totals during treatment and post periods of the experiment, although its high relationship with aesthetic quality, as pointed out above, persists throughout (but dispersed into both strategies or styles).

In general, these two tables reflect much less tendency for judgments performed in Experiment II to reflect an imbalance between style and quality. Perhaps as Huyghe (18) feels it should be, here the aesthetic quality "... is equal in either conception."

Chapter IV

Discussion

I. Overview: How the Discussion of Results Is Organized

Chapter III reported results in terms of the time sequence of this study: (1) Experiment I, (2) Structure of the Art Strategy Criteria, and (3) Experiment II. In discussing results at this point, however, these time blocks will be ignored in order to speak more broadly, across both experiments where possible, and in order to generalize in a manner congruent with significant findings. Although the second experiment is based in part on the first, both serve larger ends: (1) the search for terminology, constructs, and procedures that will aid theory building on learning in art, and (2) the long-range utility of the concept of drawing strategies to such theory building. It is these larger ends that have been used as guidelines in organizing this chapter.

II. Conditions Which Have Negligible or Ambiguous Effects upon Drawing Strategies

Process Feedback (Experiment I)

Factor E of Experiment I manipulated the amount of process feedback which subjects received. This treatment condition was operationally defined by whether subjects received two time-lapse sequences or one sequence as feedback for self-evaluation. Originally it was the intention to offer more or less feedback in the form of number of time-lapse photographs within the subject's preferred or chosen drawing for each of the drawing periods from which selection for feedback occurred (weeks B, C, and D, for evaluation in weeks C, D, and E). The thousands of prints that had to be handled in a short time, however, made this idea operationally not feasible; so the definition of amount in terms of number of sequences rather than number of photographs was agreed upon. In the researcher's opinion, this was a less appropriate form of manipulation of quantity than, say, five versus twenty time-lapse photos from a single sequence would have been. It had not been foreseen that the form of the sequences, uncut rolls, would more or less dictate this variable. Time order and quantity of photos became factors in judgments of strategy to be performed later, so it was decided upon that these uncut rolls would not be molested, for purely operational reasons. But it must be confessed that this decision was made at some possible loss of power for the feedback variable and might therefore limit or qualify the results obtained.

As indicated in Chapter III, no significant main effects were noted on process feedback on treatment or transfer gains on any of the three main dependent variables (spontaneity and divergency totals and aesthetic quality). During transfer period, however, there were two significant AxBxE interactions, one on spontaneous total gains, the other (the inverse of the former) on divergency total gains. These were not reported in Chapter III, but they can be observed in Tables XV and XIX, Appendix A, pages 95 and 99. These two three-way interactions reveal that male non-art and female art subjects are gaining in spontaneity and, conversely, male art subjects and female non-art subjects are gaining in divergency, both under the E-2 or lesser feedback condition.

Under aesthetic quality gains for transfer period, a BxDxE interaction occurred which again was not reported in Chapter III (see Table XXIII, Appendix A, page 103). On this interaction, non-art subjects do better under less feedback, regardless of drawing stimulus condition. For art subjects, however, more feedback seems to help those working from the mind drawing stimulus condition during treatment period, and this effect persists into transfer period, when the stimulus conditions are changed (that is, even when they draw from the still-life).

While other interactions occur during switch and post periods on gains on spontaneity and divergency, it is felt that these data are not firm enough to merit close analysis and discussion, since in the case of the simulated or switch gains only one drawing is involved, and in the post gains (since it followed the switch drawing in the seventh week), again, often a single drawing only is involved. In addition, the effect of the switch drawing on any subsequent drawings of that period is ambiguous. The purpose of the switch drawing was other than to reveal persisting treatment effects. In any event, what significant F-ratios there are related to process feedback and interactions with it, are judged to be beyond interpretation for the seventh week. Therefore, as earlier indicated, attention is placed on treatment and transfer gains, and largely on main effects and two-way interactions, since these are felt to be results which are firmer in stability and meaning. The post transfer drawings were included largely to explore the question concerning how plastic or changeable drawing strategies are. The analysis of variance program gave means for various sub-groups of the design, and this was its main function. Discussion of switch period will be discussed further below and in the section on drawing strategies.

Though blunted and somewhat ambiguous in the clarity of the outcomes, factor E, the process feedback variable does yield some trends. Figure 47, Appendix A, page 127, has already been described, as has Figure 44, page 125. These both plot interactions occurring with process feedback on the Osgood semantic scales used by subjects for self-ratings during treatment weeks. In general, these show that the perception of more activity for subjects classified as spontaneous is encouraged by more process feedback, and that the perception of improved quality in one's works is enhanced by less feedback by those working from the still-life, while the opposite is true of those working from mind.

In general, a close examination of process feedback means in the two way interactions occurring (as trends) with factor C (strategy classification) and factor D (implicit set, stimulus conditions), supports several generalizations. It must be emphasized that any generalizations on process feedback are tentative, and that the dynamics of Experiment I are such that the interpretor's perspective is easily lost. First, there is a connection between spontaneous subjects and more feedback and between divergent subjects and less feedback. Secondly, there is a connection between the mind stimulus and more feedback and between still-life stimulus and less feedback. Curiously enough, these connections are seen most clearly in gains on spontaneity total and divergency total seen at switch period, when subjects were asked to simulate styles opposed to their own. Here, those working from the still-life with less feedback, and divergent subjects with less feedback, do quite well in their effort to simulate spontaneity (as shown by gain scores). Conversely, those working from mind with more feedback, and spontaneous subjects with more feedback, simulate divergency well (as shown by gain scores). The average difference between spontaneity gains and divergency gains on the four comparison described above is .54 (on a three point scale), with a range of .37 to .72.

In summary on process feedback, it may be repeated that the representation of this variable operationally in treatment conditions left something to be desired. What significant interactions and trends occurred, however, are felt to be consistent and suggestive for further research. More feedback appears to aid spontaneous subjects and those drawing from mind stimulus. Less feedback appears to aid divergent subjects and those drawing from the still-life stimulus. These effects are seen most clearly and as persisting when subjects are attempting to simulate a style opposed to their own. The researcher hazards the guess that the linkages with process feedback above are those that match, in theory, the information processing and directed thinking processes attributed to the two strategies: internal stimuli and "flow" for the spontaneous; external stimuli and "bits" for the divergent.

Learning Feedback (Experiment II)

In that they are not as clear in their operational representation in experimental conditions, process feedback and learning feedback are much more difficult to discuss than other independent variables. This is not only because they yielded less information that was significant, but because their weaker representation in experimentation raises the possibility of a "type I" error -- that is, the likelihood that they are more important than these particular experimental findings suggest. It is for this reason that an extra effort is being made to assess any influences they may have.

Learning feedback, as previously described, involved direct and indirect mediation of knowledge about the content of stylistic instruction, the induced set of Experiment II. Direct mediation of knowledge was operationally defined by the instructor taking the lead in indicating to the subject correspondences and differences between his drawings and the instructed stylistic content, and by the instructor suggesting ways the subject might achieve the objectives of a given instructional period. All subjects received similar stylistic instruction each of the three weeks of the treatment period. Only the mediation of results, strategy for achieving objectives, etc., differed. Under indirect mediation, the student found the connections between his drawings and the stylistic content, and he also set his plans for achieving this content.

This variable was included, as was process feedback, to arrive at further refinements on variables of proven effectiveness in an earlier research by the researcher and Burkhart (6). In the earlier study, self-discovered criteria were shown to be more effective and motivating to subjects than predetermined criteria. In the present research, the discovery aspect was further studied, but in a context where a clear induced set or instructional objectives and content were present (which was not the case in the earlier research). The power of the learning feedback variable, however, was always felt to be such that it was subordinate to the induced set variable. Therefore, its interactions with this variable and the classification variables were of major interest.

The lore and mystique of the artist clearly supports a variable like direct-indirect mediation. As discussed elsewhere (6), there may be a decided instructional advantage to the effort to work through the subject's own perception and idiosyncratic means of evaluation.

Findings on this variable are negligible. It did not interact significantly with the induced set (factor D), nor with the three classification factors, and there were no significant main effects. There was a tendency worth reporting, however, on a main effect on aesthetic quality on post gains (see Table XI, page 54; P= .10), in which those under indirect mediation made greater gains. There was also a CxDxE interaction (P= .10) on aesthetic quality for post gains, in which subjects classified as divergent gain generally in aesthetic quality under indirect mediation on both kinds of stylistic instruction (but especially under divergent style instruction); but spontaneous subjects show a clear interaction between stylistic instruction and mediation method, in which, under the divergent style instruction, those given indirect mediation make great gains on aesthetic quality while those with direct mediation show clear losses. The opposite is true for spontaneous subjects under spontaneous style instruction. Thus on this interaction, spontaneous subjects respond differentially to the mediation (learning feedback) variable, depending on the stylistic direction of instruction, direct mediation going with spontaneous style instruction, indirect with divergent style instruction. Divergent subjects gain over spontaneous subjects in aesthetic quality at this period, and do so more under indirect mediation regardless of content of stylistic instruction. Thus is repeated a tendency for spontaneous subjects to appear as more reactive to experimental conditions.

The learning feedback variable did not significantly interact with any other variables, as already mentioned. There are not even tendencies to discusss on the spontaneity and divergent totals for treatment and post gains. Inspection of the tables of means in Appendix B, however, associates direct mediation with gains in spontaneity, whereas indirect mediation is associated with gains in divergency and gains in aesthetic quality (and the latter become especially clear after treatment stops, in post gains).

In summary, apart from aesthetic quality gains at post, and even there never reaching F-ratios at the .05 level, the learning feedback variable, represented as direct and indirect mediational methods, had negligible impact on the dependent variables. Such subtle influences as it did have, as shown by comparisons of means, appear to this researcher as logical within the developing knowledge of drawing strategies. Direct mediation is more to be associated with gains in spontaneity, indirect with gains in divergency. It must be said, however, that the learning feedback variable played a very small role in Experiment II, judging by its effects, and what effects it had were related to aesthetic quality gains (and even these were weak). As will later be shown, the effects of stylistic instruction were so powerful and free of interaction in Experiment II that all other conditions were dwarfed indeed by comparison.

It was also apparent to the researcher that where the content and objectives of instruction are clearly known by the instructor, as was true in detail in Experiment II, it may be a bit unnatural to be indirect in mediating feedback and setting future learning strategy. It is all the more surprising, thus, that there was a suggestion that some element of discovery or self-structuring continued to be associated with gains in aesthetic quality.

III. Conditions which Noticeably Affect Drawing Strategies

Implicit Set: Drawing Stimulus Conditions (Experiment I)

In a recent paper (7), the writer discussed differences in time taken for drawings as related to drawing strategy, art experience, and drawing stimulus conditions. Differences in drawing time might be thought of as partially related to manner of processing information, ability to handle information, and kinds of information to be handled. It is the latter, as represented by the implicit set created by drawing stimulus conditions, that is the first, simple and direct finding to be discussed. To round out its meaning, however, other conditions (strategy, art experience) are considered simultaneously. The finding is that subjects drawing from the still-life, drew for a longer time, and this effect was further reinforced whenever they were classified as divergent and non-art, for all of these conditions related to time spent on drawings. Conversely stated, subjects who worked from mind stimulus conditions, those classified as spontaneous, and art majors took less time on their drawings.

In a more direct fashion, however, the implicit set variable influenced changes in divergency and spontaneity scores. As previously mentioned, Figures 28 and 33, Appendix A, pages 117 and 120, reveal the characteristic "X" pattern occurring when treatment gains and transfer gains are graphed for spontaneity and divergency totals. What the "X" shows is the deflection on the strategy criteria totals when stimulus conditions are changed at transfer period. What is represented, thus, is the fact that the mean for spontaneity or divergency remains about the same under the same stimulus condition even though different groups of subjects are involved (this is another way of saying the same thing). In short, the still-life stimulus raised the divergency score, the mind stimulus the spontaneity score, and these effects are seen in mean deflections when conditions are interchanged. The clearest reaction to the implicit set variable is found among male subjects (these are the significant AxD interactions of Figures 40 and 42, Appendix A, pages 123 and 129).

The best way to sense the effect of the implicit set variable is to refer to Table VII, page 35, which compares, in detail, changes occurring on each of the 18 strategy criteria over treatment and transfer periods. On one criterion, number 16, "size relationships manipulated," which is a divergent criterion, the still-life condition deflected scores + .36 over the two periods, whereas the mind condition caused losses of -.54. This is a total separation of .90 between the two conditions, or an average separation each of the periods of nearly half a point (on a three point scale). There are dynamics involved which show up on Table VII but not in the analyses of variance. The strong deflection occurs in comparing transfer period with treatment, not treatment with pre (this is true in 17 out of 18 comparisons and is equal in the eighteenth). In other words, after experiencing the implicit set created by a stimulus condition, a change of stimulus condition brings about an intensified implicit set toward the new stimulus condition, as this is seen in style or strategy deflections. It is quite possible that this intensified reaction would subside with continued exposure.

More subjectively, the researchers detected an upsurge of energy and motivation when the implicit set was varied; but this was not readable in any changes in aesthetic quality. As Table XXVIII, Appendix A, page 108, indicates, the still-life stimulus tended to be related (but not significantly) to aesthetic quality during treatment and transfer periods (combined gains of + .39 as opposed to + .02). (Figure 38, Appendix A, page 122, shows this tendency graphically.)

During treatment period, as Figure 47, Appendix A, page 127, shows, subjects perceived their own work as improving in quality when implicit set and process feedback variables reinforced each other (DxE interaction) in a form congruent with strategy linkages already noted with these two variables: when those working under the still-life condition received less feedback, and those working under mind condition received more feedback. (Interestingly enough, the groups identified above were also judged as making the greater gains in aesthetic quality, as compared with their counterparts.)

Although not conclusive in terms of subgroups, the reader is referred to Figures 7 and 8, pages 40 and 41, where, for a student classified in each of the strategies, there is shown a sequence of three drawings illustrating strategy deflection associated with changing stimulus conditions.

In summary, the implicit set variable, which manipulated drawing stimulus conditions, had a clear effect on drawing time and caused noticeable deflections in drawing strategy. Strategy deflections were intensified when one drawing stimulus condition followed the other. The still-life increased the divergency ratings of drawings; the mind condition increased the spontaneity rating. Subjects worked longer from the still-life than from mind. Male subjects were more influenced by implicit set than female. Subjects reacted favorably to the combination of the still-life stimulus and less process feedback, and to the mind stimulus and more process feedback (corresponding to divergent and spontaneous strategy linkages). There was a slight tendency for the works done under the still-life condition to be judged as of higher aesthetic quality.

Induced Set: Stylistic Instruction Conditions (Experiment II)

As will be discussed in more detail later, the "switch" period of Experiment I, in which subjects simulated their perceived opposite style after minimal explanation of the two styles, suggested the flexibility and conscious control that accompanied drawing strategies. It was therefore a logical next step to study the changes and reactions that might arise from direct instruction of style or strategy components. The detailed judgments of the 18 strategy criteria used in Experiment I (which were already boiled down from the original 40 criteria from a previous study, 6), led to factor analysis and the abstracting of six main style clusters, three in each strategy. It was this "content," in verbal and pictorial form, which further encouraged direct instruction.

This material was organized so that one of the three clusters was taught each of the three treatment weeks (each by a different instructor), and constituted the induced set variable. Instruction was directed toward only one of the style or strategy types, so that half of the subjects were reinforced in their beginning strategy classification, but the remainder were instructed in the strategy directly opposed to their own.

By the romantic mystique of the artist, the common inheritance from the nineteenth and early twentieth century of most people in the arts, which associates style (even in its generic character) with personality and depth psychology, it would be expected that there would be resistance to changing one's working strategy. There might easily have been, it was reasoned, great frustration, blocking, hostility, and like reactions to any instruction which "crossed" one's "natural" (or even habitual) style. This possibility lingered in the mind of the researcher and his assistants, even though there was the evidence from the switch period of Experiment I. While there were minor difficulties reported by some subjects when they tried to achieve the stylistic objectives of a given instructional session, these were the exception. The ease and skill with which instructed content was incorporated into drawings, even where it meant a complete reversal, amazed the research team.

As the F-ratio's reported in Chapter III indicated, where the induced set variable of Experiment II was concerned, effects were powerful and highly significant, without interaction, and persisted significantly (with only a slight tapering off) beyond treatment. The extreme nature of the changes and persisting effects of the induced set (stylistic instruction) variable are best seen by consulting Figures 56 and 61, Appendix B, pages 165 and 168, which graph the means for this treatment condition on the spontaneous criteria and divergent criteria totals. The curves in the two figures are almost identical, except that the dotted and solid lines are interchanged. The mean difference (on a five point scale) between spontaneous style instruction (D-1) and divergent style instruction (D-2) on the spontaneous criteria total goes from .21 before treatment, to 1.93 at treatment, to 1.57 after treatment. The corresponding figures on the divergent criteria total are .03 at pre or base, 2.14 at treatment, and 1.69 at post. These differences are comparable on both strategy dependent variables, being somewhat stronger on the divergent criteria (this slight edge may possibly be related to the instructors' feelings that the divergent style characteristics are more "separable" from one another and therefore somewhat easier to present in instruction).

For a feel of what these changes mean visually, the reader is referred to Figures 17 through 20, pages 56 through 59, which give sequential drawings by art and non-art majors classified in the two strategies who received stylistic instruction in opposition to their beginning classification. While rather outstanding instances of change are chosen to illustrate the power of the induced set variable, the patterns of means discussed above suggests that these are by no means isolated cases.

Although the strategy classification variable did not interact with the induced set variable, during treatment period of Experiment II subjects gained significantly in style characteristics opposite to that in which they were classified, this significant effect disappeared at post period, although the same pattern is revealed in the means there too. Similar patterns of means occurred in Experiment I, but only approached significance (P= .10) on spontaneity gains at treatment period. These data may be somewhat attributable to "ceiling effects" or tendencies for regression toward the mean. In any event, these latter tendencies are independent of induced set.

While no significant interactions of induced set on spontaneity and divergency gains for treatment and post periods were noted, several tendencies (probabilities at the .10 level) did occur on aesthetic quality at post period. The gist of these tendencies favors divergent subjects, female subjects, art subjects, subjects receiving divergent style instruction, and subjects receiving indirect mediation of learning feedback. Not a great deal can be made of these tendencies, but it is interesting to read them over and reflect on the fact that the gains in aesthetic quality are delayed, occurring in post period of Experiment II. These five favored categories produce an average aesthetic quality gain of .33 as compared to .11 for the average of their counterparts (the strongest difference is between indirect and direct mediation of learning feedback, and the least is between art and non-art). In general, greater gains in aesthetic quality occurred in Experiment II than in Experiment I. (In Experiment I, favored conditions or groupings for gains in quality were male subjects, non-art subjects, divergent subjects, and still-life stimulus condition, as compared to their counterparts over treatment and transfer periods.)

In summary, a clearly structured induced set created by instructing subjects, verbally and pictorially, in components of one of two analyzed styles, without regard to subjects' prior styles, produces a highly significant shift toward that style, and this change persists significantly into drawings done after instruction ceases. These effects are free of interaction with sample characteristics or other treatment conditions. The effects achieved make those noted under implicit set (changing drawing stimulus conditions) in Experiment I seem very weak by comparison. Such effects as drawing stimulus conditions may have had in Experiment II were easily cancelled out by the induced set (it may be recalled that in Experiment II, building on knowledge from Experiment I, and to act as a stabilizing control, subjects classified as divergent drew only from the still-life, and those classified as spontaneous only from the mind).

While, in one sense, the strong and persisting influences of the induced set might be said merely to show that one gets what he instructs for, nothing in the literature led the researcher to expect the learning, the flexibility, and the change would be so pervasive.

IV. "Naturalistic" Aspects of Experiment I

The Idea of a Neutral Task Environment

In an earlier paper (7), the writer developed generalized concepts on how learning in art may occur. It was felt that a subject's work would improve in quality and his style become more complex and integrated through continued drawing, process feedback, self-evaluation, and relatively constant environmental conditions. Earlier research (6) had, in fact, led to these general conclusions.

In addition to these positions on the relatively "automatic" and cybernetic nature of learning in art, it was felt to be desirable to observe the dynamics, the stability, the very concept of drawing styles and strategies over a greater time period than heretofore, away from group and instructor factors, and free from other direct environmental influences. Central to this concern was the effort to record and preserve more records of drawing processes, in depth and in detail for each subject.

The term "natural," then, refers to the point of view developed above. These assumptions, in operation, define the usage of the term. Their only justification resides in that they are meant to represent the studio practices of artists, but, since the "studio" or laboratory was to be used by a number of different subjects acting as "artists," it was defined in more neutral terms than any artist's studio would likely be. The recording methods themselves made the studio more laboratory-like, although in interview and written statements collected at the end of the study, subjects did not report any negative feelings about these conditions.

Learning to Learn in a Neutral Task Environment

The discussion in this section of the report is perhaps more subjective. Actually, it attempts to make sense out of why not much happened, an effort that must involve conjecture. In a still more personal manner, what is involved is some purgation of rather romantic ideas of how learning in art occurs.

As Table V, page 31, shows, no significant F-ratios occurred on treatment period gains for any of the three main dependent variables. A few significant effects occurred during transfer period. The only main effect was that of subjects classified as divergent showing significant gains in aesthetic quality over their counterparts. Starting as low as they did, divergent subjects showed gain in quality while spontaneous subjects lost slightly. In general, however, there was little or no overall gain on the three main dependent variables in Experiment I, for treatment and transfer periods. The overall gains in means for Experiment I were static, averaging .07 and .06 across the three dependent variables for treatment and transfer. In Experiment II, corresponding figures were .06 and .19, not greatly different, but there was in comparison much movement within the treatment variables, especially that of induced set.

Perhaps it was because of the relatively static nature of most variables in Experiment I that the effect of the implicit set variable, which manipulated drawing stimulus conditions, could be seen. The treatment to transfer reversal of drawing stimulus conditions, as previously discussed, was particularly apposite in revealing these influences. What trends were observable on the process feedback variable fitted into a logical picture of implicit set-learning feedback-strategy classification connections, linking more feedback, mind stimulus, and spontaneous subjects together on the one hand, and less feedback, still-life, and divergent subjects on the other.

The biggest point to be made concerning Experiment I, however, is that less happened than was expected. Working as they did without social reinforcement, direct instruction, and learning feedback, subjects tended to "go nowhere," on the whole. Only a few cases, subjects who on their own set themselves a discipline or direction in depth, made outstanding gains in quality. And while some strategy explorations were observed, these, too, followed no pattern that analysis would reveal. In general, subjects held to their quality and style levels, except for the deflections noted earlier. The slight changes that were noticed related to the purposely slight environmental manipulations (implicit set reversal between treatment and transfer, process feedback, and the switch or simulated opposite style).

In short, subjects did not "learn to learn" by merely doing sequential drawings (with the slight exception of those who began on a very low level) and receiving process feedback for self-evaluation. This neutral atmosphere maintained the beginning level of subjects on the whole. Whenever the environment was at all changed, even in the slight manner of this experiment, corresponding deflections on the dependent variables occurred. Subjects perceived themselves relatively realistically (shown by agreement between expert judges and self-perception on Osgood scales, on activity and quality dimensions), and showed themselves capable of great conscious manipulation of their styles when asked to work opposite to their normal habit.

It seems likely, to the writer, that the idea of "depth" and "learning to learn" in art requires for its support and revelation strong instructional and environmental conditions and changes, or kinds of informational and value inputs not yet tested. Otherwise, the "learning automaton," for "artists" at this level, goes around in a circle; and there is not sufficient intrinsic motivation and internal direction likely to be present to argue for the relatively static, neutral, cybernetic, depth art environment -- at least not by itself. The purpose of providing the researcher with records and observational data related to style, however, was admirably served by these conditions.

V. Drawing Strategies Reconsidered

The data supporting the generalizations in this section are drawn from findings on stability of strategy classifications, conditions minimally and maximally affecting strategies, the factor analyses of the detailed strategy criteria, and correlation matrices of dependent and descriptive variables.

To begin with, the durability and utility of the concept of drawing strategies is, for the writer, enhanced by the two experiments of this report. At the same time, any unwarranted or unquestioned assumptions concerning personality and style, inaccessibility of style or strategy to instruction and change, and connections of a clear nature between style and quality and creativity, have been laid forcibly to rest (continuing a process begun in prior research, 6). Drawing strategies are seen as having psychological utility for describing in neutral and operational terms, a coherent system of thought processes, compounded of ends valued and transformations and means for acquiring them. The ends and operations are indissolubly linked and interacting, possessing clear internal logic. Strategies are in one sense not means for solving problems, but formal "algorithms" (this is a metaphor) which of themselves generate classes of outcomes. These, though they never cease to amaze one in their variety and complexity, are at the strategy level easily and reliably identified.

While earlier (6) the writer argued that the two strategies might be unrelated, the evidence is overwhelming that they are clearly the opposite of each other -- not point by point, but in that the one thought-and-drawing process excludes, constrains the other. Also, until clearer analysis is done employing transformational-operational-evaluational language, the components of strategies must be acknowledged to be highly intercorrelated. This is shown by the fact that the factors of criteria of a strategy are themselves highly intercorrelated. This is as true of the divergent as spontaneous strategy, even though the former can be separated into what seems like more discrete criteria. Still, since only one bi-polar factor was found (dealing with method of beginning a drawing), the writer resists attempts to judge strategies in a bi-polar manner. It is the internal consistency of the strategy under consideration, in all of its signs, that should be the judge's focus. Yet it must be confessed that a global assessment of strategy from the final product correlates very highly with the total of 18 criteria judged from detailed time-lapse drawing sequences.

Accidents of history and instruction would appear to have much to do with the strategy a subject brings to the learning experiment. This is why more sampling or screening was required to balance the strategy classification variable in Experiment II. Experiment I had shown that male art majors were most likely to be overwhelmingly spontaneous, and male non-art majors overwhelmingly divergent. Art subjects, having had more schooling in style, although rarely is it explicitly called that, were able in Experiment I to more consciously manipulate or simulate an opposite style than were non-art subjects (who were more likely to misperceive their style). In Experiment I, also, where no reinforcement of style occurred, art subjects would often shift extensively (but not in any orderly pattern). In Experiment II, where instruction in style was directly undertaken, art and non-art subjects did about equally well in changing their styles if the instruction they received countered their usual way of working.

In a more subjective vein, the researcher and his assistants observed how stylistic change may occur. First, in a more superficial manner a subject picks up the "externalia" of a style, but his thought processes (his mental strategy) may still be as it was in the other style. Thus one girl (see Figure 17, page 56) virtually redid the same landscapes she had originally conceived and executed in the spontaneous style later in the divergent style. In like manner, a subject used to working in a divergent strategy, would begin in a large, bold, free, and undetailed manner, but might end by decorative elaboration, in a flat plane spatial treatment virtually contradicting his beginning stages. Again, subjects might complain that they could not perceive the still-life in large, undifferentiated, organic terms. One girl who made a rapid change of style from spontaneous to divergent, had hidden in her earlier works in the spontaneous style clear indications of size scale manipulations, a rare occurrence in the spontaneous samples that have been judged. Still another subject, non-art, in Experiment I, would begin with a controlled, linear, planar treatment, but ended with clashing, free brush strokes, often concealing part of the earlier "controlled" structure. In interview at the close of the study it appeared that she had been urged toward freedom, texture and expression by a high school teacher, but had at the time in college a teacher stressing discipline, observation, and contour. Again, a boy admitted that he worked "freely and sloppily" because he "could not draw well or carefully" and found it more fun to work loosely.

These instances may give some content to the statement that style or strategy is remarkably plastic and consciously manipulable by subjects of college age. By and large, conscious change of style did not act against the achievement of quality. In fact, switching styles or being instructed in opposed styles levelled out any sample bias correlating aesthetic quality with spontaneity, so that it could be said that the achievement of quality become equally likely in either style.

In summary, psychologically and experimentally, the concept of strategy or style appears to be firm and useful, but quite plastic and consciously manipulable, by the self and by direct instruction, with no loss in aesthetic quality. Strategies or styles are concepts of great historically continuity, but can be revealed in endless and varied outcomes. Within a particular style, however, it is the internal consistency despite the variations in form and quality which are striking. The traditions in art education do not mention direct stylistic manipulation, but treat it as a tabooed subject. When asked, for example, whether she would have made sweeping reversals in styles on her own (having just done so under instruction), an art major girl replied: "No, because I would not have begun differently; and in my art classes I receive instruction only after I am underway. So I would begin as I always had."

Vitality of style may depend on availability of alternatives, not one at the exclusion of the other. Or it may be that an alternative, while not pursued, clarifies the style one chooses. Choice is thus emphasized over chance, accident, subtle influence, and artistic mystique. In the individual's style, as in that of a culture, conscious change and perspective may be needed to keep it alert and plastic, just as it was sensed that the neutral depth environment of Experiment I did not encourage change and learning. While the style one uses is not the end toward which subjects may consciously work, it appears that certain ends emerge from one mode of though, others from the other.

VI. Evaluation of the Usefulness of the Chosen Psychological Concepts for the Study of Learning and Change in Sequential Drawings

In this study, as was described in Chapter I, there was a conscious effort to select terms from psychological learning theory which might aid theory building related to learning and change in the sequential drawing context. The terms were structured, generally and operationally, as follows:

1. Context or task environment:

   Learning Set

   a. Implicit learning set (Experiment I)
      (1) still-life stimulus
      (2) mental stimulus

   b. Induced learning set (Experiment II)
      (1) Style instruction: spontaneous style
      (2) Style instruction: divergent style

2. Feedback

   a. Process feedback (Experiment I)
      (1) More process feedback
      (2) Less process feedback

   b. Learning feedback (Experiment II)
      (1) Direct mediation
      (2) Indirect mediation

3. Evaluation (learner's response to feedback)

4. Transfer (reversal of implicit learning set conditions in Experiment I)

While these terms may indeed have been borrowed from psychology, their use in the present context, and as developed in an earlier paper of the writer's (7), is deliberately arbitrary, to a high degree, to fit his own series of drawing-learning experiments. Within this arbitrariness, however, is the desire to rise to a broad level of generalization through inclusive concepts which are logically related to each other on a higher level of abstraction, and represented *partially* in experimentation by explicit operational terms on a lower level of abstraction. These two levels of abstraction are of necessity in constant interaction, in that the large concept imputes broader meaning than merited to the operational concepts subsumed under it, while the operational concepts in turn serve as a check and correction to theory generated at the higher level of abstraction, since any new findings on the operational level must be incorporated into emerging theory.

Seen in this way, not the concepts themselves, but the structure into which they have arbitrarily been placed is useful. It has given the researcher, operating with complex human behavior in a field not structured for ease of empirical psychological inquiry, some place to hang his theoretical hat. Even if it should later fall apart or be regarded as fiction, it is seen as useful from this point of view. It is an attempt to escape from mere fact collecting on the one hand, and theory too broadly separated from experimental operations on the other.

Chapter V

Conclusions, Implications, and Recommendations

I. Conclusions

The two experiments reported herein have manipulated learning set and feedback conditions,held evaluation relatively constant, and observed the results of transfer in reversing implicit learning set (drawing stimulus) conditions.

Feedback Conditions

Feedback conditions were relatively weak in their effects (and in their operational representation in experimentation), but what effects or trends existed were congruent with prior findings on art strategies (6); and through association with learning set conditions, the effects noted served to extend the knowledge of art strategies. Apparently the subtle feedback variables of this study had some effect (usually delayed and appearing after treatment) on aesthetic quality and (during treatment) on a subject's perception of his own drawings. Specifically:

1. More process feedback appears to aid subjects classified as spontaneous and those drawing from the mind stimulus condition. (Experiment I)

2. Less process feedback aids divergent subjects and those drawing from the still-life stimulus condition. (Experiment I)

3. The above interactions occur most clearly when subjects are attempting to simulate a style they perceive as opposed to their own. (Experiment I)

4. The learning feedback variable, represented by direct and indirect mediational methods in instruction, had generally negligible impact on the dependent variables. What effects it had were without interaction. (Experiment II)

5. Direct mediation is associated with gains in spontaneity, indirect with gains in divergency. (Experiment II)

6. There was a tendency for there to be a post period gain in aesthetic quality for subjects receiving indirect mediation during treatment. (Experiment II)

Learning Set Conditions

Learning set conditions yielded clearest outcomes:

1. An implicit learning set, as determined in this study by drawing

stimulus conditions, can be read on style and quality changes. This is especially so when transfer effects are studied by reversing the drawing stimulus conditions (actually, transfer does not occur, but rather a deflection toward the expected effect of the physically existing stimulus condition, apparently intensified by what preceded it). (Experiment I)

2. The still-life increased the divergency ratings of drawings; the mind condition increased the spontaneity rating. (Experiment I)

3. Subjects worked longer from the still-life than from mind. (Experiment I)

4. Male subjects were more influenced by implicit learning set conditions than female. (Experiment I)

5. There was a tendency for subjects to react favorably to the combination of still-life and less process feedback, or, conversely, to mind stimulus and more process feedback. (Experiment I)

6. There was a tendency for works done under the still-life condition to be judged as of higher aesthetic quality. (Experiment I)

7. An induced learning set, represented by detailed stylistic instruction, very significantly affects stylistic changes in the direction of the instruction, without interaction, and with little influence on aesthetic quality (and that is delayed). (Experiment II)

8. The induced learning set persists significantly into post treatment drawings, with only slight recovery or regression to the benchmark style. (Experiment II)

9. Although not formally construed as a study of induced learning set, the instruction to subjects to switch into the opposite of their perceived style was, in effect, a blunt induced learning set, which produced significant, conscious changes in style (seen graphically and in analysis tables by the cancellation of differences between the strategy classification groups). (Experiment I)

Learning in a Neutral Task Environment

Change and learning are not clearly observable through mere repetition of drawings over six and seven week periods, even under what were felt to be good conditions for self-change and learning. A strong induced learning set appears to be needed. (Experiment I compared with Experiment II)

The Nature of Drawing Strategies

The utility and importance of the concept of drawing strategies or styles for the study of learning and change in art is incontrovertible. Specifically:

1. Judgments of strategy or style variables are highly reliable, and these variables are sensitive to a variety of experimental conditions.

2. Detailed strategy criteria are highly intercorrelated. Even factors derived by factor analysis of detailed strategy criteria are significantly and highly related. Though the two strategies have high negative intercorrelation, there is no one to one matching of detailed criteria, as they appear on factors, that would suggest judgments should be made using bipolar sclaes.

3. There is a consistent tendency for subjects classified as spontaneous and as art majors to score higher on aesthetic quality (but not on gains on aesthetic quality). A comparison of samples in Experiment I with Experiment II, however, suggests that this common finding may be a bias in sampling, in which there is merely less representation of strong divergent styles in art samples and, conversely, spontaneous styles in non-art.

4. Styles or strategies are extremely flexible and easily influenced, both directly and consciously, and indirectly and without awareness.

Sample Characteristics and Reactivity of Subjects

1. It is difficult to find divergent art males among art students, unless an effort is made to include design and architecture options.

2. It is difficult to locate spontaneous non-art males without wider sampling than is required to locate divergent non-art males.

3. Spontaneous subjects, male subjects, and art majors are more reactive to experimental influences.

4. Gains in aesthetic quality are most associated with divergent subjects, with female subjects, and those receiving divergent implicit or induced learning sets. Where gains in aesthetic quality are concerned, thus, lesser reactivity and greater adaptation to experimental conditions are likely to be found.

The Selected Concepts for Describing Learning Experiments in Drawing

Though hardly a bona fide conclusion, the researcher feels that both the search for concepts in psychological learning theory which might be translated into the aborning psychology of art, and the admittedly somewhat arbitrary structure of such concepts woven for this study, are justified, valuable procedures. Whether this is merely the builder's pride and involvement must await further testing.

II. Implications

Strategies appear to be plastic and open to conscious change and direct instruction, despite a near taboo on this score in art education. It would appear that choice, habit, and various kinds of direct and subtle reinforcements more stringently influence drawing style than global personality traits. Although some "fit" undoubtedly can be found between style in art and personality dynamics, the connection is much more tenuous than the literature (e.g., references 18, 34) or the researcher's prior studies and those of his associates (references 6, 8, 12) would have it.

Something of a "hare over turtle" and "turtle over hare" effect may be present in the reversals noted between reactivity to experimental conditions and adaptation, the former seen as extreme style fluctuations, the latter as gains in aesthetic quality. In general, the indirect and subtle conditions of experimentation would appear to be linked with gains in aesthetic quality. Such gains, however, were slight and delayed (post treatment). Although spectacular changes in quality are reported in the literature on art education, the question rises as to how representative or rare such occurrences really are.

It seems to the researcher that not personality, but the logic of the role one assumes in choosing a strategy or style (consciously or by long-standing habit) is the clue to the observed linkages between style and experimental conditions. This viewpoint is seen as endorsing the "expectancy theory" of perception. Thus it "makes sense" that more *process feedback* aided spontaneous subjects and those drawing from mind stimulus, whereas *less process feedback* aided divergent subjects and those drawing from still-life stimulus. In like fashion, direct mediation of *learning feedback* was linked to the spontaneous style, indirect mediation to the divergent. These data were seen as matching the information processing and directed thinking processes attributed to the two strategies: internal stimuli and "flow" for the spontaneous; external stimuli and "bits" for the divergent. In other terms, one might refer to the "reactivity" and "adaptation" levels discussed above.

In the "mediation" variable,, the association of direct with spontaneous, indirect with divergent, suggests a qualification of the internal-external stimuli (a poor use of terms, admittedly) where the interpersonal sphere is concerned. Direct mediation here refers, most likely, to intensification of feeling, as well as to "flow" of information for the spontaneous style, and to dispersal or levelling of affect, as well as to "bits" of information for the divergent style. While in the interpersonal sphere this tendency here noted is in contrast to the positive "opposites" effect noted in prior research (6), in the present study the "style" of the instructor was not a factor, as in the former study. And mediation of *learning feedback* in the present research was decidedly subordinate to the strong *induced learning set* variable which was its focus and source for comparative content.

Somewhat contrary to the implications read into a prior study (6), and to a position taken in a recent paper by the researcher (7), to repeat what was given as a conclusion above, change and learning are *not* clearly observable through mere repetition of drawings over six and seven week periods, even under what were felt to be good conditions for self-change and learning. A strong *induced learning set* appears to be needed.

Strategy or style is more open to change under experimental conditions than aesthetic quality, and, thus, at this point in time, to scientific study. In a sense, however, strategy is "form" and not "content," the "plan" and not the "problem," the "procedure" and not the "pretext," the "mode of thought" and not the "matter." In other words, that aesthetic quality is not greatly influenced by the severe style changes observed is in itself provocative. To the researcher, it was unexpected. It was thought, for example, that style instruction would result in significant quality change for non-art subjects, but this did not occur.

In still another sense, however, no one in the arts likes to separate content and form (let alone attempt a definition of either); and strategy is not form but the form-maker, or form is its residue, so to speak. Here there is need for "meta-concepts" which can pick up the thorny problems of symbol-making, thematic pretext, idiosyncratic content, guiding myth, emergent myth, or what have you.

The instrumentation for this research was more than adequate in producing process records, in the form of time-lapse photographs, for judgment and experimental feedback. The thousands of records resulting (around 20,000, is the estimate), constitute potentially valuable records for closer scrutiny of strategy dynamics. Judgments completed for this study, however, suggest that much less in-process data is necessary to make reliable and sensitive strategy assessments; but because the process feedback variable is still in need of further experimentation, it seems too soon to change the data collection method. Instructors in Experiment II, also, felt it valuable to have such complete records available for the feedback-evaluation part of the experiment.

In summary, the implication drawn from this research is that the taboo on direct style instruction, and the romantic mystique on style related to this taboo, are open to question, upon consideration of how styles can be literally reversed with little or no affect upon aesthetic quality. Despite this extreme plasticity of styles, a logic is discernible between a chosen style and the environmental and experimental conditions to which it is responsive. By and large, aesthetic quality changed little in these experiments, either from repeated drawing or experimental conditions. As mentioned, such gains as were observed were not related to the induced and indirect style changes, at least not where these occurred in their strongest forms. The importance, generally, of strong induced learning sets for bringing about any kind of change in drawing styles, seems inescapable. Again, such emphasis on direct, detailed instruction as used in this study (Experiment II), stylistic or otherwise, is rarely seen in art education literature. It must be remembered, however, that this direct instruction had as its content no polemical or qualitative bias. Its content was the internal logic of a style or strategy, as revealed through progressive analyses from research itself.

III. Recommendations for Further Research

While a host of research problems could be detailed, the following strike the researcher as most fruitful for further study:

1. As an aid to explanatory power and theory-building, continued borrowing and construction of selected concepts into logical systems is encouraged. At the present, almost no systems related to empirical research exist within the psychology of art.

2. There should be continued study of the 20,000 in-process records of this study. One such study, in progress, given as an example, manipulates the in-process stage of a drawing as a factor in determining the quality and meaning which a judge will assign to a drawing.

3. Because the language applied to in-process series is inclined to be descriptive and passive, rather than operational and transformational, simulation of drawing strategies by computers and like but simpler means is recommended. Such simulations should have a generally salutary effect on the language used for styles and strategies, rescuing them from philosophical or critical language, useful in their proper context, but obfuscating within the psychology of art.

4. The reactivity-adaptation phenomena, alluded to in prior discussion, as related to style, experimental conditions, and gains in aesthetic quality, needs clarification.

5. The feedback variables, process feedback and learning feedback, need continued study and stronger representation in chosen experimental operations. Since tendencies on these variables were logical and provocative, they should be retained and strengthened.

6. Since subjects can perceive their own strategy and work with fair objectivity, and since they can consciously and effectively change their style, experimentation could well emphasize self-chosen induced learning set and learning feedback conditions, and contrast these with the arbitrarily assigned conditions of this study. It would be particularly enlightening to see whether the strong stylistic changes noted under present conditions would occur. The guess is that they would not.

7. The question of congruent vs. opposite style-experimental condition linkages in the interpersonal influence sphere, remains partly unresolved: that is, where style change and quality change are the concern, is it better or not to have similar style and treatment conditions, where these are mediated by a person? Should, for example, a subject classified as spontaneous be given direct, forceful mediation? This question is hard to answer, for it is likely that it interacts with other experimental conditions. It is not felt to be beyond simulated role experimentation, however.

8. Most important to the researcher at this point, is the suggestion that the strong induced learning set dealing with direct stylistic instruction be crossed with an equally strong induced learning set dealing with the "symbolic content sources" which might operationally represent the ideas, feelings, pretexts, or myths behind the drawing activity. In one sense, such a variable would represent the "extra-art" influences which may indeed partially determine aesthetic and creative differences in drawings. If this recommendation seems vague, it is doubtlessly because of the inadequacies of language and thought at the present moment. It is, frankly, the researcher's "hunch" of where to go next (along with recommendations 1, 3, and

6 above). Borrowed, selected, and arbitrary concepts are not yet available for this task. In the art lore, these extra-art forces are variously attributed to a tradition; the "mystery" of the craft, art, or medium; and to the artist, master, or teacher. In experimentation, such influences would be symbolically represented through induced learning set conditions.

Chapter VI

Summary

I. The Problem and Its Background

Two closely related art learning experiments were conducted in a setting where college undergraduates, trained and untrained in art, made sequential drawings over a six and seven week period under relatively constant conditions, except for the introduction of controlled treatment influences. Both experiments grew from earlier research (Beittel, 6). The second experiment built, in part, on the outcomes of the first. The first experiment was deliberately kept more "naturalistic" in climate, which meant that treatment conditions were subtle and indirect.

Experiment I was so structured that it would yield many records and drawings for further descriptive analysis of drawing strategies. The concept of drawing strategies developed in earlier studies (references 6, 7, and 8) was submitted to extensive scrutiny through detailed judgments of process records (time-lapse photographs of the evolution of drawings) and a search for simple structure in these.

There was a conscious attempt to select terms from psychological learning theory which could be used on a high level of abstraction for theory building on learning in art. The terms chosen were given somewhat arbitrary definitions and built into a structure in relation to one another. It was reasoned that on a lower level of abstraction these terms could be represented by a variety of operationally defined treatment or environmental conditions. An attempt was made to utilize these structured concepts in this manner in the experiments of this study.

There were a number of related studies felt to be important as background to the two experiments of this study. The art strategies used herein, spontaneous and divergent, were delineated in previous literature (references 6, 7, and 8). The general nature of strategies has been described in psychological writing (references 9, 10, and 26) and in experimentation involving simulation of human problem-solving heuristics on computers (references 28, 29). As used in art, strategy as a concept has much in common with certain usages of the term "style," especially as this term took on formal criteria which set two antithetical styles off from one another (e.g., Wolfflin, 37, and Rothschild, 34). The lore of art associates style with a pervasive temperament or personality to be found in a period, place, or person (references 18, 19, 33, and 34), but this tendency, in a more general form, may also be found in psychology (references 4 and 20). Most contemporary art historians and critics, however, are more cautious and scholarly in their treatment of style (e.g., Gombrich, 14, 15; Ackerman, 1, 2; Schapiro, 35; and Peckham, 31).

As background to this study, it was also felt to be significant that there are viewpoints in the literature suggesting possible formal, repetitive, and developmental bases for change in art (e.g., Kellogg, 21; Alexander, 3; Morris, 27; and Peckham, 31). And the present experiments were the direct outgrowth of earlier ones which delineated and represented a "self-reflective learning environment," by the writer and Burkhart (reference 6).

Finally, the ground work for selection of concepts from psychological learning theory was carried out and reported in a paper completed just prior to this research (Beittel, 7).

In summary form, the concepts selected and defined for this study were as follows:

1. *Context* or *task* environment, as represented by the *learning set*. There may be an *implicit learning set* of which the learner is not consciously aware and which may arise from subtle environmental conditions or predisposing characteristics of the learner himself. The experimenter, however, must designate *implicit learning sets* as such only when they are clearly represented by subject classification or (subtle) environmental conditions built into the experiment design. Verbal instruction is typically not included under this term. An *induced learning set* is represented by overt, primarily verbal (but not necessarily) instructions concerning what is to be learned, how it is to be learned, etc. Here the learner is left with little doubt about the nature of the *task environment*.

2. *Feedback* has two subcategories: *process feedback* and *learning feedback*. *Process feedback* refers to some defined sample of a learner's performance (time-lapse in-process photographs of drawings in this study) which are made available to the learner at a specified time and under stipulated conditions within an experiment. In *learning feedback*, there is information (knowledge of results) concerning the status of a drawing, especially where that information is tied directly to an *induced learning set*. Such information is typically verbal, but need not be.

3. *Evaluation* is arbitrarily restricted to the learner's response, usually overt and under stipulated conditions in an experiment, to one or both forms of *feedback*. Again, this is apt to be represented by oral or written verbal response, but need not be.

4. *Transfer* is a term referring to a broad test of the power, retention, positive or negative effect of learning or of some treatment condition in a modified *task environment*.

II. Objectives

Experiment I attempted to set up a naturalistic task environment in which an *implicit learning set* (differing drawing stimulus conditions) and *process feedback* (more or less time-lapse photos of drawing processes) were varied. After the treatment period, the transfer occurring when *implicit learning set* conditions were reversed, was observed. At the last session, an exploratory *induced learning set* was introduced which, after minimal description of the concept of art strategies, asked subjects to simulate the opposite of their perceived strategy.

Indirectly, Experiment I was also designed to test whether subjects would change in style or aesthetic quality in the relatively neutral, naturalistic *task environment*, as the result of a series of sequential drawings over a seven week period, under minimal influence, but provided with process feedback and a procedure for (self) evaluation.

In addition, Experiment I yielded extensive in-process records of drawings. These were the basis for analysis of the structure of detailed art strategy criteria (the most extensive to date).

Experiment II attempted to create a clearly instructional task environment in which an induced learning set (style instruction toward the spontaneous or divergent style) and learning feedback (direct or indirect mediation of information concerning the relationship of the learner's drawings to the induced learning set) were varied. The content for style instruction, verbal and pictorial, was derived from the factor analysis of the detailed art strategy criteria performed on judgments from works from Experiment I. In Experiment II subjects classified as spontaneous or divergent at the beginning of experimentation worked under an implicit set (drawing stimulus conditions) found to relate to their strategy classification in Experiment I (spontaneous subjects drew from mind stimulus, divergent subjects from the still-life).

III. Method

Subjects worked in what might be called a laboratory studio. They worked one at a time, for hourly periods. Standard drawing pad, black drawing ink, brushes, pen, and mixing pans were used, and these remained constant. Subjects sat or stood at a drawing table over which was mounted at a 45 degree angle a front surface mirror, from which an electronically operated and timed "robot" 35mm. camera picked up time-lapse records of each drawing. The camera and related instrumentation were out of sight of the subject. Twenty time-lapse photos were taken, on the average, of each drawing.

Under stipulated conditions, an assemblage-like, many sided still-life was used as a drawing stimulus. When not in use, the still-life was out of sight. It was on rollers so that it could be positioned, when used, as the subject desired. The room was private, quiet, and free from distracting sounds and sights. When the still-life was not used, the subject was surrounded by white walls, free of decoration.

Both Experiment I and Experiment II had the same underlying experimental design. This was a balanced multi-factor analysis of variance design of five factors, with two levels each (2x2x2x2x2). In each experiment, factors A, B, and C were classification factors (sex, art training, and beginning art strategy, respectively). Factors D and E were treatment factors, as follows:

Experiment I

Factor D: implicit learning set
  D-1, still-life stimulus
  D-2, mind stimulus

Factor E: process feedback
  E-1, more process feedback
  E-2, less process feedback

Experiment II

Factor D: induced learning set
D-1, style instruction: spontaneous style
D-2, style instruction: divergent style

Factor E: learning feedback
E-1, direct mediation of information
E-2, indirect mediation of information

Experiment I lasted seven weeks (A, B = base or pre; C, D, E = treatment; F = transfer; G=switch and post). Experiment II lasted six week (O=screening; A=pre; B, C, D=treatment; E=post). In Experiment II an effort was made to obtain better balanced classification cells by wider screening of subjects.

The sample in both experiments consisted of undergraduate males and females, art majors and non-majors, classified as beginning in the spontaneous or divergent strategy, each in equal numbers. Subjects were largely sophomores. There were thirty-two in each experiment.

Dependent variables consisted of spontaneity, divergency, and aesthetic quality. These were represented as gain or change scores from the benchmark (pre-treatment) position of each subject. The strategy or style variables were judged from the in-process, time-lapse photographic series, while aesthetic quality was judged from the actual completed drawings. In Experiment I, 18 detailed strategy criteria were judged. In Experiment II, six strategy factors (criteria clusters) were judged.

Additional descriptive variables were analyzed (particularly in Experiment I) including time for drawings, vertical-horizontal format choices, and Osgood scales for self-ratings of drawings. During the last three weeks of Experiment II, GSR patterns were recorded during the first drawing of these sessions and later analyzed.

In the analyses of variance, attention was directed mostly to treatment gains and transfer or post gains. The error term used for analysis of variance included all of the four factor interactions (giving it six instead of one degree of freedom).

In both experiments, judgments of dependent variables were intercorrelated in various ways to understand their structure. The detailed judgments of the 18 strategy criteria performed on works from Experiment I were intercorrelated and submitted to a principal components factor analysis and varimax rotation, from which six factors, three in each strategy, were derived. These became the week to week content of factor D (induced learning set, style instruction) in Experiment II and were also the basis for judgments of the strategy variables on works from that experiment.

IV. Findings and Conclusions

Reliability of Judgments and Description of Strategy Factors

Judgments of strategy and aesthetic quality were highly reliable (averaging .819 for Experiment I and .918 for Experiment II). Factor analysis and factor rotation of the 18 detailed strategy criteria used in Experiment I produced six factors, three in each strategy, with acceptable apparent logic behind them. These were labelled as follows: (1) process dialogue (spontaneous); (2) spatial continuity (spontaneous); (3) big central attack (spontaneous); (4) controlled detail (divergent); (5) elaboration and pattern (divergent); and (6) segmented form and space (divergent). These factors are such that, looking across strategies, 1 and 5 may be compared, as may 2 and 6, and 3 and 4. The six factors are, however, highly intercorrelated. Total scores for spontaneity and divergency, across factors or criteria, are highly negatively correlated. Since criteria from the two strategies do not occur, (with one exception, for the way a drawing is begun) on the same factor, it was argued that they should not be considered as strictly bipolar.

Effects of Feedback Conditions

Though weak in their effects (and in their operational representation in experimentation), feedback conditions did help to extend knowledge about art strategies. In Experiment I, more process feedback aided spontaneous subjects and those drawing from the mind stimulus condition, and less process feedback was associated with divergent subjects and the still-life condition. In Experiment II, there was a tendency for direct mediation of information, or learning feedback, to be associated with gains in spontaneity, while indirect mediation was related with gains in divergency. Post treatment gains in aesthetic quality occurred for subjects receiving indirect mediation of learning feedback (during treatment).

Effects of Learning Set Conditions

In Experiment I, an implicit learning set, determined by drawing stimulus conditions, was related to style and aesthetic quality changes. This was especially true when treatment and transfer periods are compared, since the drawing stimulus conditions existing in the treatment period were reversed during transfer. The still-life increased the divergency ratings of drawings; the mind condition increased the spontaneity. Subjects worked a longer time from the still-life than from mind. Male subjects were more influenced by implicit learning set conditions than female. There was a tendency for subjects to react favorably to the combination of still-life and less process feedback, or, conversely, to mind stimulus and more process feedback. Works done under the still-life condition were judged as of slightly higher aesthetic quality.

In Experiment II, an induced learning set, in the form of detailed stylistic instruction, very significantly affected style change in the direction of the instruction, without interaction, and with little influence on aesthetic quality (and that delayed). These effects persisted significantly into post treatment drawings, with only slight recovery or return to the benchmark style of a subject. In Experiment I, in the last week of the experiment, a kind of induced learning set relating to style was given a trial when subjects were asked to simulate the opposite of their perceived style and were able to produce conscious, significant changes in style.

Learning in a Neutral Task Environment

In comparing Experiment I with Experiment II, it was observed that change in style and quality did not occur through mere repetition of drawings over a seven week period, even under what were felt to be good conditions for self-change and learning. Apparently a strong induced learning set or its equivalent is needed.

Drawing Strategies

The utility and importance of the concept of drawing strategies as a focus for the study of learning and change in art was further underscored by this study. As mentioned above, strategy criteria, in several forms, can be reliably judged, broken into logical factors, and these made the content for stylistic instruction. Although consistently chosen and displayed by a subject in the absence of environmental influence, styles or strategies are extremely flexible and easily influenced, both directly and consciously, and indirectly and without a subject's awareness.

Connections (interactions) observed between strategy classification or gains on strategy dependent variables, suggested that linkages are congruent with the internal consistency of a strategy, not in opposition to it. It was reasoned, for example, that spontaneous subjects responded to "flow" of information and internal stimuli (direct mediation, more process feedback, mind stimulus), while divergent subjects responded to "bits" (indirect mediation, less process feedback, still-life stimulus).

Sample Characteristics and Reactivity of Subjects

In general, it was difficult to find divergent art males and spontaneous non-art males. Spontaneous subjects, male subjects, and art majors are more reactive to experimental influences. Gains in aesthetic quality, however, are likely to be associated with divergent subjects, female subjects, and those receiving divergent implicit or induced learning sets. Such gains are often delayed and post treatment, favoring, in general, lesser reactivity and greater adaptation to experimental conditions.

Evaluation of Selected Concepts for Describing Learning Experiments in Art

Although it may be only a temporary gain stemming, in part, from the builder's pride and involvement, it is felt that the concepts chosen and defined for the purpose of advancing theory in learning within the psychology of art did serve the function of weaving the scattered findings of the two experiments of this study into one fabric. The use to which these concepts are put herein, however, presupposes a primary focus on strategy or style changes as a problem of fundamental importance to the psychology of artistic creation.

V. Implications and Recommendations

One of the chief implications drawn from this research is that the taboo on direct style instruction, and the romantic mystique on style supporting this taboo, are open to serious question, upon consideration of how styles can be literally reversed with no apparent harmful side effects. Despite this extreme plasticity of styles, a logic is discernible between a chosen or induced style and the environmental and experimental conditions to which it is open or closed.

By and large, aesthetic quality changed little in these experiments; and such gains as were observed were not related to repetition of drawing experiences or to the strongly induced style changes.

Apparently strong, induced learning sets are necessary to bring about any noticeable change in drawing styles, although subtle effects from implicit learning sets can be analyzed. While there was an example of direct, detailed instruction in this study, it had in its content no polemical or qualitative bias, since it was derived from structural analysis of the internal logic of a style or strategy, as obtained from progressive analyses from research itself.

The fact that aesthetic quality changed but little, and that when it did it was associated with subtle influences, delayed in time, with more adaptive than reactive subjects and conditions, of itself provokes further questions concerning the source and nature of the "extra-art" forces which may shape quality and lead to increased creative achievement in art. Apparently style or strategy changes are not the source of gains or losses in quality, although the researcher felt direct style instruction might increase quality of work in non-art subjects and possibly inhibit art subjects.

Monet's injunction to young artists (quoted in Chapter I) to draw continuously, with its hidden assumption that this practice and repetition will be the source for "learning to learn" in art, is open to some question, as far as knowledge from these experiments goes. Perhaps there is in the arts an inclination to refer to the exception, the rare case, in describing what art ought to be like. This predilection for the highly valued and the extreme may be a poor guide, however, in describing how change, how "learning to learn," may actually take place. The researcher is slowly disabusing himself of a romantic leaning on this score.

There are several directions for further research emerging from this study. As an aid to explanatory power, continued attempts at theory-building are urged, wherein broad and abstract concepts stand in relation to and encompass a variety of empirical and operational conditions. To move from passive, descriptive language now foremost in strategy criteria, it is recommended that simulation of drawing strategies be undertaken, where the givens, the operations, the transformations, the evaluative or test criteria must all be explicitly stated in order to generate a simulated drawing (this would doubtlessly concentrate on formal-technical aspects of drawing). The feedback variables (process feedback and learning feedback) need further study and stronger experimental representation than was possible in this research. Since subjects' perception of their drawings and styles are rather objective, self-chosen induced learning sets and learning feedback conditions might be studied against the arbitrarily assigned conditions of this study (the researcher's hunch is that much less style change would occur, but he is uncertain as to how aesthetic quality would be influenced).

Finally, and presently the most appealing direction to the researcher, is the suggestion that the induced learning set dealing with style instruction be crossed with an induced learning set dealing with "symbolic content sources" which operationally stand for the ideation, feeling, pretext, or myth behind the drawing activity. Such a variable would make a beginning in a still more highly tabooed area --symbol-making, and the "extra-art" influences thought to partially determine aesthetic and creative differences in drawing. As with style, this effort would have to be "non-heated" and highly abstract in its representation. There is, to be sure, much mystery remaining in the study of art strategy, even though it has shown itself to be highly amenable to inquiry and influence. But there is nothing like crossing one mystery (of which a little is known) with another (of which nothing is known).

References

1. Ackerman, James S. and Carpenter, Rhys. Art and Archaeology. Englewood Cliffs, New Jersey: Prentice-Hall, Inc. 1963. 241p.

2. Ackerman, James S. "Art and Evolution." p. 32-40 in Kepes, Gyorgy (ed.). The Nature and Art of Motion. New York: George Braziller. 1965. 195p.

3. Alexander, Christopher. "The Origin of Creative Power in Children." British Journal of Aesthetics. II, No. 3, July 1962. p. 207-226.

4. Allport, Gordon W. and Vernon, Philip E. Studies in Expressive Movement. New York: MacMillan Co. 1933.

5. Beardsley, Monroe C. "On the Creation of Art." Journal of Aesthetics and Art Criticism. XXIII, No. 3, Spring 1965. p. 291-304.

6. Beittel, Kenneth R. Effect of Self-Reflective Training in Art on the Capacity for Creative Action. Unpublished report, Cooperative Research Project No. 1874, Office of Education, U. S. Department of Health, Education, and Welfare. December 1964. 242p.

7. Beittel, Kenneth R. "Sketches toward a Psychology of Learning in Art." p. 173-221 in Mattil, Edward L. A Seminar in Art Education for Research and Curriculum Development. Unpublished report, Cooperative Research Project V-002, Office of Education, U. S. Department of Health, Education, and Welfare. June 1966. 433p.

8. Beittel, Kenneth R. and Burkhart, Robert C. "Strategies of Spontaneous, Divergent, and Academic Art Students." Studies in Art Education, V, No. 1, Fall 1963. p. 20-41.

9. Berlyne, D. E. Structure and Direction in Thinking. New York: John Wiley & Sons, Inc. 1965. 378p.

10. Bruner, Jerome S.; Goodnow, Jacqueline J.; and Austin, George A. A Study of Thinking. New York: John Wiley & Sons. 1956. 330p.

11. Burgart, Herbert J. Art in Higher Education: The Relationship of Art Experience to Personality, General Creativity, and Aesthetic Performances. Unpublished doctoral thesis, The Pennsylvania State University. 1961.

12. Burkhart, Robert C. Spontaneous and Deliberate Ways of Learning. Scranton: International Textbook Co., 1962. 260p.

13. Ehrenzweig, Anton. "Conscious Planning and Unconscious Scanning." p. 27-49 in Kepes, Gyorgy (ed.). Education of Vision. New York: George Braziller. 1965. 233p.

14. Gombrich, E. H. Art and Illusion. New York: Pantheon Books. 1960.

15. Gombrich, E. H. "Meditations on a Hobby Horse, or the Roots of Artistic Form." p. 209-228 in White, Lancelot Law. Aspects of Form. Bloomington, Indiana: Indiana University Press, 1961. 249p.

16. Harris, Dale B. Children's Drawings as Measures of Intellectual Maturity. New York: Harcourt, Brace, and World. 1963. 367p.

17. Harris, Dale B. "Learning Theory, Cognitive Processes, and the Teaching-Learning Component." p. 141-165 in Mattil, Edward L. A Seminar in Art Education for Research and Curriculum Development. Unpublished report, Cooperative Research Project V-002, Office of Education, U. S. Department of Health, Education, and Welfare. June 1966. 433p.

18. Huyghe, Rene. Ideas and Images in World Art. New York: Henry N. Abrams, Inc. 1959. 447p.

19. Itten, Johannes. Design and Form: The Basic Course at the Banhaus. New York: Reinhold Publishing Corp. 1963. 190p.

20. Kagan, Jerome. "Impulsive and Reflective Children: The Significance of Conceptual Tempo." p. 133-161 in Krumboltz, John D. (ed.) Learning and the Educational Process. Chicago: Rand McNally & Co. 1965. 277p.

21. Kellogg, Rhoda. What Children Scribble and Why. Palo Alto, California: N-P Publications. 1955.

22. Kuhns, Richard. "The Abiding Values of Art." p. 42-48 in Hook, Sidney (ed.). Art and Philosophy. New York: New York University Press. 1966. 346p.

23. Lippman, Edward A. "The Problem of Musical Hermeneutics: A Protest and Analysis." p. 307-335 in Hook, Sidney (ed.). Art and Philosophy. New York: New York University Press. 1966. 346p.

24. Lowenfeld, Viktor. The Nature of Creative Activity. New York: Harcourt, Brace, and Co. 1939. 272p.

25. Mattil, Edward L. A Seminar in Art Education for Research and Curriculum Development. Unpublished report, Cooperative Research Project V-002, Office of Education, U. S. Department of Health, Education, and Welfare. June 1966. 433p.

26. Miller, George A.; Galanter, Eugene; and Pribram, Karl H. Plans and the Structure of Behavior. New York: Henry Holt and Co. 1960. 226p.

27. Morris, Desmond. The Biology of Art. New York: Alfred A. Knopf. 1962. 176p.

28. Newell, A.; Shaw, J. K.; and Simon, H. A. "Report on a General Problem-Solving Program." p. 256-264 in *Proceedings of the International Conference on Information Processing*. Paris, 1959.

29. Newell, Allen; Shaw, J. C.; and Simon, Herbert A. "The Processes of Creative Thinking." p. 63-119 in Gruber, Howard E, *et al*. (editors). *Contemporary Approaches to Creative Thinking*. New York: Atherton Press. 1962. 223p.

30. Osgood, Charles, et al. *The Measurement of Meaning*. Urbana, Illinois: The University of Illinois Press. 1957.

31. Peckham, Morse. *Man's Rage for Chaos: Biology, Behavior, and the Arts*. Philadelphia: Chilton Co. 1965. 339p.

32. Read, Herbert. *Education through Art*. New York: Pantheon Books. 1945. 320p.

33. Roman, Klara G. *Handwriting*. New York: Pantheon Books, Inc. 1952. 382p.

34. Rothschild, Lincoln. *Style in Art*. New York: Thomas Yoseloff, Publisher. 1960. 224p.

35. Schapiro, Meyer. "Style." p. 278-303 in Tax, Sol, ed. *Anthropology Today*. Chicago: The University of Chicago Press. 1962. 481p.

36. Smith, Karl V. and Smith, Margaret Foltz. *Cybernetic Principles of Learning and Educational Design*. New York: Holt, Rinehart and Winston, Inc. 1966. 529p.

37. Wolfflin, Heinrich. *Principles of Art History*. New York: Dover Publications, Inc. 1950.

Appendix A: Supplementary Data Related to Experiment I

Table XII

Experiment I: Reliability Estimates for Eighteen Strategy Criteria as Judged by Three Trained Art Judges

Criterion Number	Low (Average inter-judge agreement)	High (Average of judges with judge total)	$r_{\bar{a}\bar{a}}$*
1	.616	.861	.828
2	.719	.900	.881
3	.559	.839	.792
4	.643	.872	.843
5	.363	.756	.631
6	.738	.907	.894
7	.613	.860	.826
8	.553	.836	.788
9	.637	.869	.840
10	.531	.825	.773
11	.648	.874	.890
12	.615	.861	.827
13	.626	.864	.834
14	.528	.827	.770
15	.571	.844	.800
16	.639	.871	.842
17	.641	.871	.843
18	.656	.877	.851
Average	.605	.856	.819

$$*r_{\bar{a}\bar{a}} = \frac{a\, r_{11}}{1 + (a-1)r_{11}}$$

a = number of raters
r_{11} = average inter-judge agreement

Table XIII

Experiment I: Intercorrelations of Two Untrained Art and Two Untrained Non-Art Judges and the Three Trained Art Judges for Experiment I on Four Strategy Criteria (Numbers 3, 8, 15, 17)

N=105

	Trained Art (3)				
	Criterion 3	Criterion 8	Criterion 15	Criterion 17	Average
Untrained Art (2)	.413	.122	.610	.469	.404
Untrained Non-Art (2)	.467	.383	.456	.559	.466
Combined Untrained (4)	.516	.298	.581	.567	.491

$r_{\text{Untrained Art (2), Untrained Non-Art (2)}}$ on the 4 criteria:

Criterion 3	Criterion 8	Criterion 15	Criterion 17	Average
.464	.462	.578	.490	.499

$r_{\bar{a}\bar{a}}$ (for the two untrained and one trained team combined) = .712

(All above correlations are significant at .01 level except untrained art judges and trained art judges on criterion 8)

Table XIV

Experiment I: Analysis of Variance Table
Treatment Period Gains on Spontaneous Criteria Total
N=32

Source of Variation[1]	Degrees of Freedom	Sum of Squares	Mean Squares	F-Ratio	Probability
A	1	.0050	.0050	------	------
B	1	.0041	.0041	------	------
AB	1	.0741	.0741	1.572	------
C	1	.1953	.1953	4.142	.10
AC	1	.0013	.0013	------	------
BC	1	.0841	.0841	------	------
D	1	.1596	.1596	3.385	.25
AD	1	.0841	.0841	1.783	------
BD	1	.1568	.1568	3.326	.25
CD	1	.0055	.0055	------	------
BCD	1	.2312	.2312	4.903	.10
E	1	.0703	.0703	1.491	------
AE	1	.2312	.2312	4.903	.10
BE	1	.0005	.0005	------	------
CE	1	.1891	.1891	4.011	.10
DE	1	.0990	.0990	2.100	.25
ABE	1	.1378	.1378	2.923	.25
Within[2]	6	.2824	.0472	------	------
Total	31	2.3420	------	------	------

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[1] Three factor interactions are shown only where the F-Ratio attains a probability of at least .25.

[2] The Within or Error figure includes the five four factor interactions.

Table XV

Experiment I: Analysis of Variance Table
Transfer Period Gains on Spontaneous Criteria Total
N=32

Source of Variation[1]	Degrees of Freedom	Sum of Squares	Mean Squares	F-Ratio	Probability
A	1	.0536	.0536	------	------
B	1	.1785	.1785	2.606	.25
AB	1	.8745	.8745	12.767	.025
C	1	.1116	.1116	1.630	.25
AC	1	.0830	.0830	1.212	------
BC	1	.1907	.1907	2.783	.25
ABC	1	.3301	.3301	4.819	.10
D	1	.3301	.3301	4.819	.10
AD	1	1.9950	1.9950	29.124	.005
BD	1	.0385	.0385	------	------
CD	1	.0893	.0893	1.303	------
E	1	.0081	.0081	------	------
AE	1	.3894	.3894	5.685	.10
BE	1	.0428	.0428	------	------
CE	1	.3634	.3634	5.305	.10
DE	1	.0007	.0007	------	------
ABE	1	1.0768	1.0768	15.719	.01
Within[2]	6	.4110	.0685	------	------
Total	31	6.8695	------	------	------

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[1] Three factor interactions are shown only where the F-Ratio attains a probability of at least .25.

[2] The Within or Error figure includes the five four factor interactions.

Table XVI

Experiment I: Analysis of Variance Table
Switch (Simulation of Perceived Opposed Strategy) Gains on Spontaneous Criteria Total
N=32

Source of Variation[1]	Degrees of Freedom	Sum of Squares	Mean Squares	F-Ratio	Probability
A	1	.0639	.0639	------	------
B	1	.0830	.0830	------	------
AB	1	.6757	.6757	4.126	.10
C	1	1.0695	1.0695	6.530	.05
AC	1	.1639	.1639	1.001	------
BC	1	.5177	.5177	3.161	.25
D	1	.0043	.0043	------	------
AD	1	1.9159	1.9159	11.698	.025
BD	1	.3424	.3424	2.090	.25
CD	1	1.1363	1.1363	6.938	.05
ABD	1	.5968	.5968	3.644	.25
BCD	1	1.3820	1.3820	8.438	.05
E	1	1.1213	1.1213	6.846	.05
AE	1	.4975	.4975	3.038	.25
BE	1	.9419	.9419	5.751	.10
CE	1	.3507	.3507	2.141	.25
DE	1	.2610	.2610	1.594	------
ABE	1	1.3163	1.3163	8.037	.05
ACE	1	1.4663	1.4663	8.953	.025
Within[2]	6	.9729	.1621	------	------
Total	31	15.2473	------	------	------

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[1] Three factor interactions are shown only where the F-Ratio attains a probability of at least .25.

[2] The Within or Error figure includes the five four factor interactions.

Table XVII

Experiment I: Analysis of Variance Table
Post Period Gains on Spontaneous Criteria Total
N=32

Source of Variation[1]	Degrees of Freedom	Sum of Squares	Mean Squares	F-Ratio	Probability
A	1	.0621	.0621	1.052	------
B	1	.0935	.0935	1.535	------
AB	1	.3677	.3677	6.034	.05
C	1	.1526	.1526	2.505	.25
AC	1	.1288	.1288	2.114	.25
BC	1	.0751	.0751	1.396	------
D	1	.0026	.0026	------	------
AD	1	1.3001	1.3001	21.337	.005
BD	1	.2984	.2984	4.897	.10
CD	1	.0694	.0694	1.139	------
ABD	1	.1610	.1610	2.643	.25
BCD	1	.5805	.5805	9.527	.025
E	1	.0443	.0443	------	------
AE	1	.2129	.2129	3.494	.25
BE	1	.0790	.0790	1.297	------
CE	1	.0176	.0176	------	------
DE	1	.0030	.0030	------	------
BCE	1	.1907	.1907	3.129	.25
CDE	1	.4584	.4584	7.523	.05
Within[2]	6	6.3652	.0609	------	------
Total	31	4.7601	------	------	------

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[1] Three factor interactions are shown only where the F-Ratio attains a probability of at least .25.

[2] The Within or Error figure includes the five four factor interactions.

Table XVIII

Experiment I: Analysis of Variance Table
Treatment Period Gains on Divergent Criteria Total
N=32

Source of Variation[1]	Degrees of Freedom	Sum of Squares	Mean Squares	F-Ratio	Probability
A	1	.0732	.0732	------	------
B	1	.0185	.0185	------	------
AB	1	.0488	.0488	------	------
C	1	.0215	.0215	------	------
AC	1	.0536	.0536	------	------
BC	1	.0000	.0000	------	------
D	1	.0371	.0371	------	------
AD	1	.0413	.0413	------	------
BD	1	.0473	.0473	------	------
CD	1	.0443	.0443	------	------
E	1	.0140	.0140	------	------
AE	1	.0007	.0007	------	------
BE	1	.0639	.0639	------	------
CE	1	.1418	.1418	1.311	------
DE	1	.0088	.0088	------	------
ABE	1	.2032	.2032	1.879	.25
Within[2]	6	.6490	.1082	------	------
Total	31	1.9617	------	------	------

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[1] Three factor interactions are shown only where the F-Ratio attains a probability of at least .25.

[2] The Within or Error figure includes the five four factor interactions.

Table XIX

Experiment I: Analysis of Variance Table
Transfer Period Gains on Divergent Criteria Total
N=32

Source of Variation[1]	Degrees of Freedom	Sum of Squares	Mean Squares	F-Ratio	Probability
A	1	.0000	.0000	------	------
B	1	.2363	.2363	1.889	.25
AB	1	.4632	.4632	3.702	.25
C	1	.0872	.0872	------	------
AC	1	.2503	.2503	2.000	.25
BC	1	.0007	.0007	------	------
ABC	1	.3465	.3465	2.769	.25
D	1	.4163	.4163	3.327	.25
AD	1	1.2129	1.2129	9.693	.025
BD	1	.1582	.1582	1.264	------
CD	1	.0205	.0205	------	------
ABD	1	.2363	.2363	1.889	.25
E	1	.0713	.0713	------	------
AE	1	.0306	.0306	------	------
BE	1	.0095	.0095	------	------
CE	1	.6527	.6527	5.216	.10
ABE	1	.7595	.7595	6.070	.05
Within[2]	6	.7508	.1251	------	------
Total	31	6.0229	------	------	------

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[1] Three factor interactions are shown only where the F-Ratio attains a probability of at least .25.

[2] The Within or Error figure includes the five four factor interactions.

Table XX

Experiment I: Analysis of Variance Table
Switch (Simulation of Perceived Opposed Strategy) Gains on
Divergent Criteria Total
N=32

Source of Variation[1]	Degrees of Freedom	Sum of Squares	Mean Squares	F-Ratio	Probability
A	1	.0406	.0406	------	------
B	1	1.8241	1.8241	5.843	.10
AB	1	.0265	.0265	------	------
C	1	.3698	.3698	1.185	------
AC	1	.0018	.0018	------	------
BC	1	.3570	.3570	1.144	------
D	1	.0561	.0561	------	------
AD	1	1.3203	1.3203	4.229	.10
BD	1	.4325	.4325	1.385	------
CD	1	.6845	.6845	2.192	.25
BCD	1	1.1175	1.1175	3.580	.25
E	1	.7200	.7200	2.306	.25
AE	1	.0841	.0841	------	------
BE	1	.4950	.4950	1.586	------
CE	1	.3828	.3828	1.226	------
DE	1	.0882	.0882	------	------
ABE	1	2.0910	2.0910	6.698	.05
Within[2]	6	1.8732	.3122	------	------
Total	31	12.6126	------	------	------

---

[1] Three factor interactions are shown only where the F-Ratio attains a probability of at least .25.

[2] The Within or Error figure includes the five four factor interactions.

Table XXI

Experiment I: Analysis of Variance Table
Post Period Gains on Divergent Criteria Total
N=32

Source of Variation[1]	Degrees of Freedom	Sum of Squares	Mean Squares	F-Ratio	Probability
A	1	.0010	.0010	------	------
B	1	.5725	.5725	6.243	.05
AB	1	.0021	.0021	------	------
C	1	.0105	.0105	------	------
AC	1	.1922	.1922	2.096	.25
BC	1	.0210	.0210	------	------
D	1	.0072	.0072	------	------
AD	1	1.4706	1.4706	16.037	.01
BD	1	.0200	.0200	------	------
CD	1	.0078	.0078	------	------
BCD	1	.2701	.2701	2.946	.10
E	1	.2312	.2312	2.521	.10
AE	1	.1275	.1275	1.391	------
BE	1	.0968	.0968	1.056	------
CE	1	.0351	.0351	------	------
DE	1	.0685	.0685	------	------
CDE	1	.2145	.2145	2.339	.10
Within[2]	6	.5502	.0917	------	------
Total	31	4.1736	------	------	------

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[1] Three factor interactions are shown only where the F-Ration attains a probability of at least .25.

[2] The Within or Error figure includes the five four factor interactions.

Table XXII

Experiment I: Analysis of Variance Table
Treatment Period Gains on Aesthetic
Quality Judgment of Final Products
N=32

Source of Variation[1]	Degrees of Freedom	Sum of Squares	Mean Squares	F-Ratio	Probability
A	1	.5671	.5671	2.614	.25
B	1	.0496	.0496	------	------
AB	1	.0561	.0561	------	------
C	1	1.0658	1.0658	4.912	.10
AC	1	.0685	.0685	------	------
BC	1	.1058	.1058	------	------
D	1	.4005	.4005	1.846	.25
AD	1	.2211	.2211	------	------
BD	1	.3403	.3403	1.568	------
CD	1	.0162	.0162	------	------
E	1	.0761	.0761	------	------
AE	1	.4418	.4418	2.036	.25
BE	1	.1458	.1458	------	------
CE	1	.7021	.7021	3.236	.25
DE	1	.4418	.4418	2.036	.25
Within[2]	6	1.3016	.2170	------	------
Total	31	6.9742	------	------	------

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[1] Three factor interactions are shown only where the F-Ratio attains a probability of at least .25.

[2] The Within or Error figure includes the five four factor interactions.

Table XXIII

Experiment I: Analysis of Variance Table
Transfer Period Gains on Aesthetic
Quality Judgment on Final Products
N=32

Source of Variation[1]	Degrees of Freedom	Sum of Squares	Mean Squares	F-Ratio	Probability
A	1	.0205	.0205	------	------
B	1	.1845	.1845	1.083	------
AB	1	.8945	.8945	5.248	.10
C	1	1.9257	1.9257	11.299	.025
AC	1	.5382	.5382	3.158	.25
BC	1	.3549	.3549	2.082	.25
D	1	.0935	.0935	------	------
AD	1	.4876	.4876	2.861	.25
BD	1	.0011	.0011	------	------
CD	1	.1238	.1238	------	------
E	1	.0371	.0371	------	------
AE	1	.2646	.2646	1.553	------
BE	1	.6413	.6413	3.763	.25
CE	1	.1639	.1639	------	------
DE	1	.4442	.4442	2.606	.25
BDE	1	1.0695	1.0695	6.275	.05
Within[2]	6	1.0224	.1704	------	------
Total	31	9.1641	------	------	------

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[1] Three factor interactions are shown only where the F-Ratio attains a probability of at least .25.

[2] The Within or Error figure includes the five four factor interactions.

Table XXIV

Experiment I: Analysis of Variance Table
Switch (Simulation of Perceived Opposed Strategy) Gains on Aesthetic Quality Judgment of Final Products
N=32

Source of Variation[1]	Degrees of Freedom	Sum of Squares	Mean Squares	F-Ratio	Probability
A	1	.0020	.0020	------	------
B	1	.8353	.8353	2.818	.25
AB	1	.2646	.2646	------	------
C	1	1.5976	1.5976	5.391	.10
AC	1	.1339	.1339	------	------
BC	1	.2468	.2468	------	------
D	1	.5539	.5539	1.860	.25
AD	1	3.3865	3.3865	11.427	.025
BD	1	.3140	.3140	------	------
CD	1	.6413	.6413	2.164	.25
ABD	1	.5698	.5698	1.923	.25
E	1	.0473	.0473	------	------
AE	1	.1726	.1726	------	------
BE	1	.0332	.0332	------	------
CE	1	1.1363	1.1363	3.834	.10
DE	1	.0124	.0124	------	------
ACE	1	1.5008	1.5008	5.064	.10
Within[2]	6	1.7781	.2964	------	------
Total	31	14.7324	------	------	------

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[1] Three factor interactions are shown only where the F-Ratio attains a probability of at least .25.

[2] The Within or Error figure includes the five four factor interactions.

Table XXV

Experiment I: Analysis of Variance Table
Post Period Gains on Aesthetic Quality Judgment on Final Products
N=32

Source of Variation[1]	Degrees of Freedom	Sum of Squares	Mean Squares	F-Ratio	Probability
A	1	.8483	.8483	2.508	.25
B	1	.1339	.1339	------	------
AB	1	.4584	.4584	------	------
C	1	.3850	.3850	------	------
AC	1	.0132	.0132	------	------
BC	1	.0000	.0000	------	------
D	1	.2646	.2646	------	------
AD	1	.4255	.4255	------	------
BD	1	.0570	.0570	------	------
CD	1	.0038	.0038	------	------
E	1	.1024	.1024	------	------
AE	1	.4442	.4442	------	------
BE	1	.7051	.7051	2.084	.25
CE	1	.9557	.9557	2.825	.25
DE	1	.2032	.2032	------	------
Within[2]	6	2.0296	.3383	------	------
Total	31	8.3757	------	------	------

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[1] Three factor interactions are shown only where the F-Ratio attains a probability of at least .25.

[2] The Within or Error figure includes the five four factor interactions.

Table XXVI

Experiment I: Means for Spontaneous Criteria Total for Treatment Groups over Time Line

	Pre O	Treatment A	Transfer B	Switch C	Post D	Treatment Gains	Transfer Gains	Switch Gains	Post Gains
A1	.56	.58	.56	.62	.69	0.02	0.00	0.06	0.13
A2	.54	.57	.62	.68	.75	0.03	0.08	0.14	0.21
							0.08	0.14	0.21
B1	.82	.86	.79	.87	1.04	0.04	-0.03	0.05	0.22
B2	.30	.29	.40	.43	.40	-0.01	0.10	0.13	0.10
C1	.72	.67	.71	.64	.82	-0.05	-0.01	-0.08	0.10
C2	.38	.48	.48	.67	.62	0.10	0.10	0.29	0.24
D1	.53	.48	.68	.64	.71	-0.05	0.15	0.11	0.18
D2	.57	.66	.51	.66	.73	0.11	-0.06	0.09	0.16
E1	.58	.56	.64	.49	.71	-0.02	0.06	-0.09	0.13
E2	.52	.59	.55	.81	.73	0.07	0.03	0.29	0.21
Grand Means	.55	.57	.59	.65	.72	0.02	0.04	0.10	0.17

Table XXVII

Experiment I: Means for Divergent Criteria Total for Treatment Groups over Time Line

	Post O	Treatment A	Transfer B	Switch C	Post D	Treatment Gains	Transfer Gains	Switch Gains	Post Gains
A1	.72	.73	.73	.68	.74	0.00	0.00	-0.05	0.01
A2	.60	.71	.60	.62	.61	0.11	0.00	0.02	0.01
B1	.46	.55	.55	.68	.61	0.09	0.09	0.22	0.15
B2	.87	.91	.78	.62	.74	0.04	-0.09	-0.25	-0.13
C1	.55	.59	.61	.65	.59	0.04	0.06	0.10	0.04
C2	.77	.86	.72	.65	.76	0.09	-0.05	-0.12	-0.01
D1	.68	.78	.57	.63	.71	0.10	-0.11	-0.05	0.03
D2	.64	.67	.76	.67	.64	0.03	0.12	0.03	-0.00
E1	.65	.73	.60	.78	.75	0.08	-0.05	0.13	0.10
E2	.68	.72	.73	.52	.60	0.04	0.05	-0.16	-0.08
Grand Means	.66	.73	.66	.65	.67	0.07	0.00	-0.01	0.01

*Gains or Losses over Base

Table XXVIII

Experiment I: Means for Aesthetic
Quality for Treatment Groups over Time Line

	Pre O	Treatment A	Transfer B	Switch C	Post D	Treatment Gains	Transfer Gains	Switch Gains	Post Gains
A1	2.17	2.43	2.30	2.14	2.41	0.26	0.13	-0.04	0.24
A2	2.45	2.43	2.49	2.43	2.35	-0.02	0.04	-0.02	-0.10
B1	2.79	2.87	2.78	2.60	2.81	0.08	-0.01	-0.19	0.02
B2	1.83	1.99	2.01	1.96	1.96	0.16	0.18	0.13	0.13
C1	2.47	2.41	2.33	2.22	2.44	-0.06	-0.14	-0.25	-0.03
C2	2.15	2.45	2.46	2.34	2.33	0.30	0.31	0.19	0.18
D1	2.32	2.55	2.33	2.16	2.49	0.23	0.01	-0.16	0.17
D2	2.30	2.31	2.46	2.41	2.28	0.01	0.16	0.11	-0.02
E1	2.28	2.35	2.42	2.21	2.39	0.07	0.14	-0.07	0.11
E2	2.34	2.51	2.37	2.35	2.37	0.17	0.03	0.01	0.03
Grand Means	2.31	2.43	2.40	2.28	2.38	0.12	0.09	-0.03	0.07

*Gains or Losses over Base

Table XXIX

Experiment I: Analysis of Variance Table
Sum of Horizontal Picture Format Choices
N=32

Source of Variation[1]	Degrees of Freedom	Sum of Squares	Mean Squares	F-Ratio	Probability
A	1	101.5313	101.5313	6.153	.05
B	1	38.2813	38.2813	2.320	.25
AB	1	7.0313	7.0313	------	------
C	1	9.0313	9.0313	------	------
AC	1	0.7813	0.7813	------	------
BC	1	38.2813	38.2813	2.320	.25
D	1	1.5313	1.5313	------	------
AD	1	1.5313	1.5313	------	------
BD	1	1.5313	1.5313	------	------
CD	1	0.0313	0.0313	------	------
E	1	5.2813	5.2813	------	------
AE	1	9.0313	9.0313	------	------
BE	1	3.7813	3.7813	------	------
CE	1	0.0313	0.0313	------	------
DE	1	2.5313	2.5313	------	------
BCE	1	38.2813	38.2813	2.320	------
CDE	1	47.5313	47.5313	2.880	------
Within[2]	6	98.9375	16.4929	------	------
Total	31	454.2188	--------	------	------

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[1] Three factor interactions are shown only where the F-Ratio attains a probability of at least .25.

[2] The Within or Error figure includes the five four factor interactions.

Table XXX

Experiment I: Analysis of Variance Table
Sum of Vertical Picture Format Choices
N=32

Source of Variation[1]	Degrees of Freedom	Sum of Squares	Mean Squares	F-Ratio	Probability
A	1	140.2813	140.2813	7.968	.05
B	1	247.5313	247.5313	14.060	.01
AB	1	22.7812	22.7812	1.294	------
C	1	108.7813	108.7813	6.179	.05
AC	1	16.5312	16.5312	------	------
BC	1	7.0312	7.0312	------	------
D	1	30.0313	30.0313	1.706	.25
AD	1	7.0312	7.0312	------	------
BD	1	16.5312	16.5312	------	------
CD	1	42.7812	42.7812	2.430	.25
BCD	1	75.0313	75.0313	4.212	.10
E	1	7.0313	7.0313	------	------
AE	1	30.0312	30.0312	1.706	.25
BE	1	3.7812	3.7812	------	------
CE	1	42.7812	42.7812	2.430	.25
DE	1	9.0312	9.0312	------	------
ABE	1	148.7813	148.7813	8.451	.05
ADE	1	81.2813	81.2813	4.617	.10
Within[2]	6	107.6873	17.9515	------	------
Total	31	1192.9688	--------	------	------

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[1] Three factor interactions are shown only where the F-Ratio attains a probability of at least .25.

[2] The Within or Error figure includes the five four factor interactions.

Table XXXI

Experiment I: Analysis of Variance Table
Self-Ratings of Drawings on
Osgood Evaluative Scales for Treatment Periods
N=32

Source of Variation[1]	Degrees of Freedom	Sum of Squares	Mean Squares	F-Ratio	Probability
A	1	0.9453	0.9453	------	------
B	1	12.6253	12.6253	4.026	.10
AB	1	15.8203	15.8203	5.045	.10
C	1	20.9628	20.9628	6.685	.05
AC	1	0.3003	0.3003	------	------
BC	1	17.2578	17.2578	5.503	.10
ABC	1	8.3029	8.3029	2.648	------
D	1	8.3028	8.3028	2.648	------
AD	1	0.2278	0.2278	------	------
BD	1	10.0128	10.0128	3.193	.25
CD	1	6.0378	6.0378	1.925	.25
E	1	0.5778	0.5778	------	------
AE	1	1.9503	1.9503	------	------
BE	1	11.1628	11.1628	3.560	.25
CE	1	3.3153	3.3153	1.057	------
DE	1	0.0153	0.0153	------	------
ABE	1	18.4529	18.4529	5.884	.10
Within[2]	6	18.8112	3.1358	------	------
Total	31	167.5372	-------	------	------

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[1] Three factor interactions are shown only where the F-Ratio attains a probability of at least .25.

[2] The Within or Error figure includes the five four factor interactions.

Table XXXII

Experiment I: Analysis of Variance Table
Self-Ratings of Drawings on
Osgood Activity Scales for Treatment Periods
N=32

Source of Variation[1]	Degrees of Freedom	Sum of Squares	Mean Squares	F-Ratio	Probability
A	1	12.5000	12.5000	3.363	.10
B	1	7.4113	7.4113	1.994	.25
AB	1	0.1800	0.1800	------	------
C	1	53.0450	53.0450	14.269	.01
AC	1	41.8613	41.8613	11.261	.025
BC	1	2.2050	2.2050	------	------
D	1	7.6050	7.6050	2.046	.25
AD	1	3.2513	3.2513	------	------
BD	1	21.7800	21.7800	5.859	.10
CD	1	0.9113	0.9113	------	------
E	1	0.5513	0.5513	------	------
AE	1	0.5000	0.5000	------	------
BE	1	7.0312	7.0312	1.891	.25
CE	1	26.6450	26.6450	7.168	.05
DE	1	0.4050	0.4050	------	------
BCE	1	21.1250	21.1250	5.683	.10
CDE	1	53.5612	53.5612	14.408	.01
Within[2]	6	22.3040	3.7181	------	------
Total	31	299.8238	-------	------	------

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[1] Three factor interactions are shown only where the F-Ratio attains a probability of at least .25.

[2] The Within or Error figure includes the five four factor interactions.

Table XXXIII

Experiment I: Analysis of Variance Table
Self-Rating of Drawings on
Osgood Potency Scales for Treatment Periods
N=32

Source of Variation[1]	Degrees of Freedom	Sum of Squares	Mean Squares	F-Ratio	Probability
A	1	11.6403	11.6403	1.858	.25
B	1	1.8528	1.8528	------	------
AB	1	21.9453	21.9453	3.502	.25
C	1	6.5703	6.5703	1.049	------
AC	1	0.2628	0.2628	------	------
BC	1	1.5753	1.5753	------	------
D	1	10.9278	10.9278	1.744	.25
AD	1	9.3528	9.3528	1.493	------
BD	1	2.4753	2.4753	------	------
CD	1	0.3403	0.3403	------	------
BCD	1	12.6254	12.6254	2.015	.25
E	1	1.3203	1.3203	------	------
AE	1	0.0903	0.0903	------	------
BE	1	6.5703	6.5703	1.049	------
CE	1	13.6503	13.6503	2.179	.25
DE	1	4.2778	4.2778	------	------

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[1] Three factor interactions are shown only where the F-Ratio attains a probability of at least .25.

[2] The Within or Error figure includes the five four factor interactions.

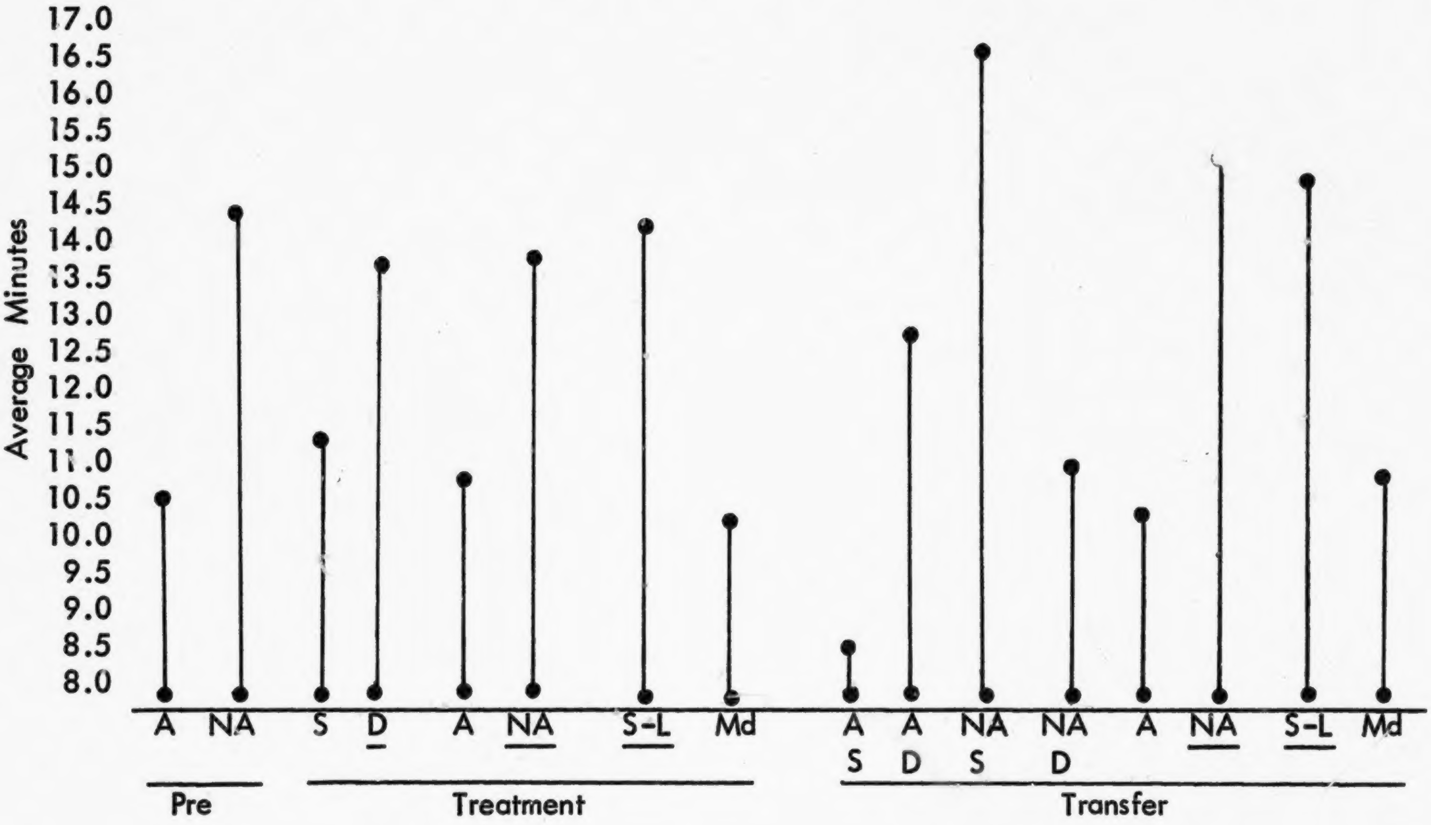


Figure 21 : Experiment I: Independent Variables in Relation to Drawing Time in Minutes (Means)

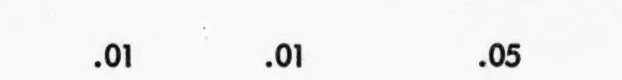
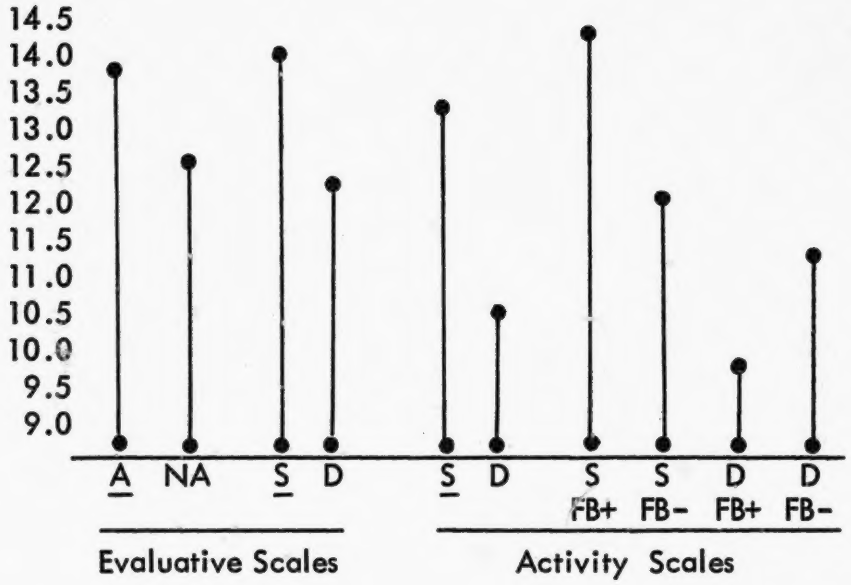
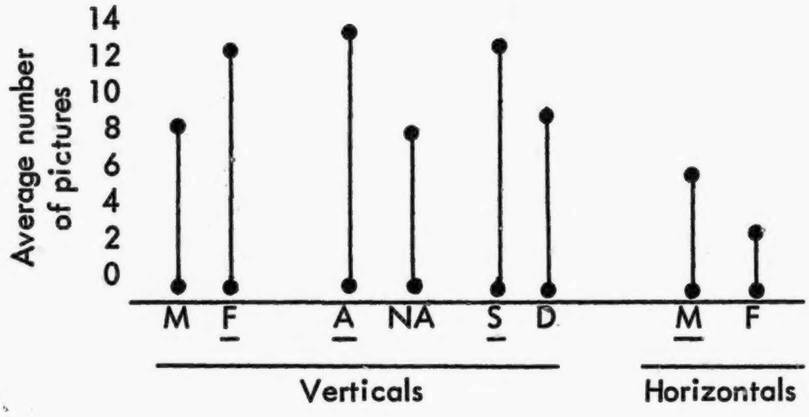


Figure 22: Experiment I: Independent Variables in Relation to Total S% (of pictures)



F at .10 .05 .01 .05 (interaction)

Figure 23: Experiment I: Self-Rating of Pictures on Osgood Evaluative and Activity Scales



F at .05 .01 .05 .05

Figure 24: Experiment I: Pictures Grouped by Vertical or Horizontal Format Choice

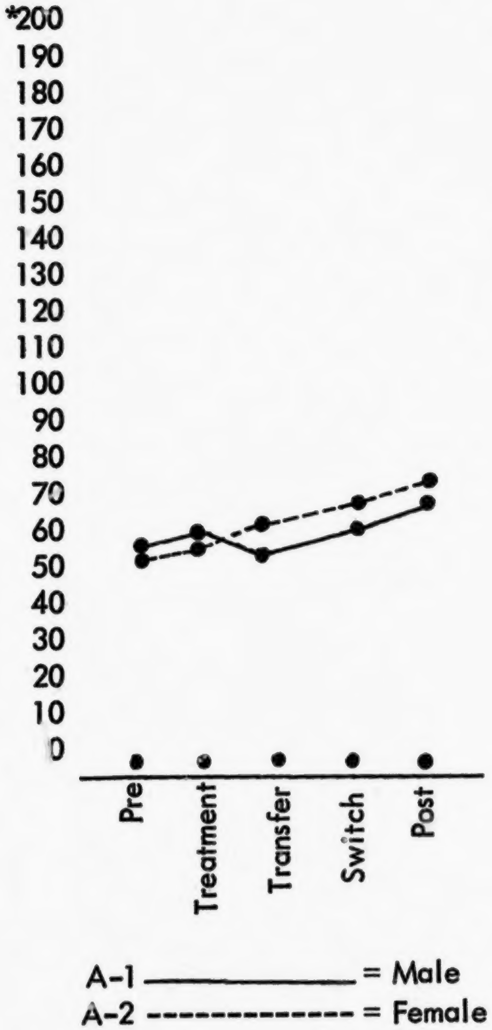


Figure 25: Experiment I: Spontaneous Criteria Total by Experimental Periods

Factor A

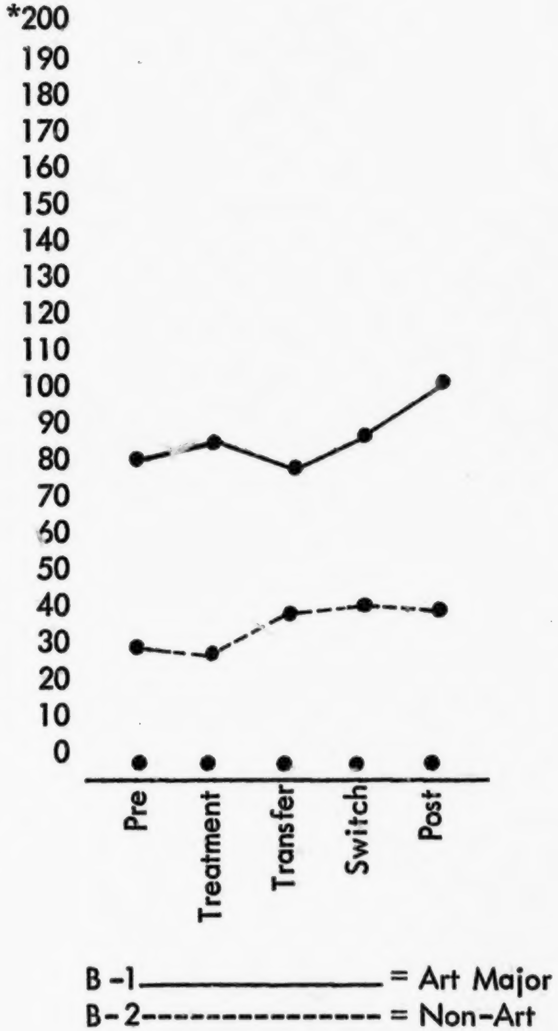
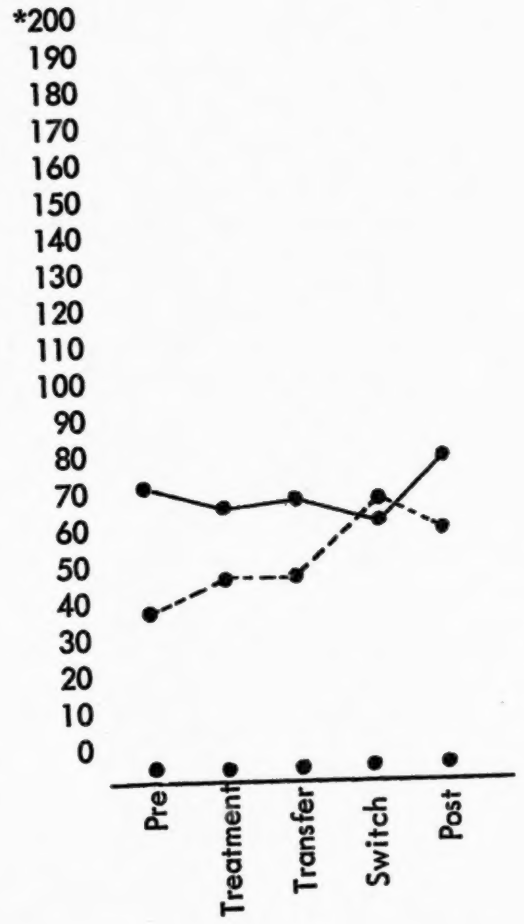


Figure 26: Experiment I: Spontaneous Criteria Total by Experimental Periods

Factor B

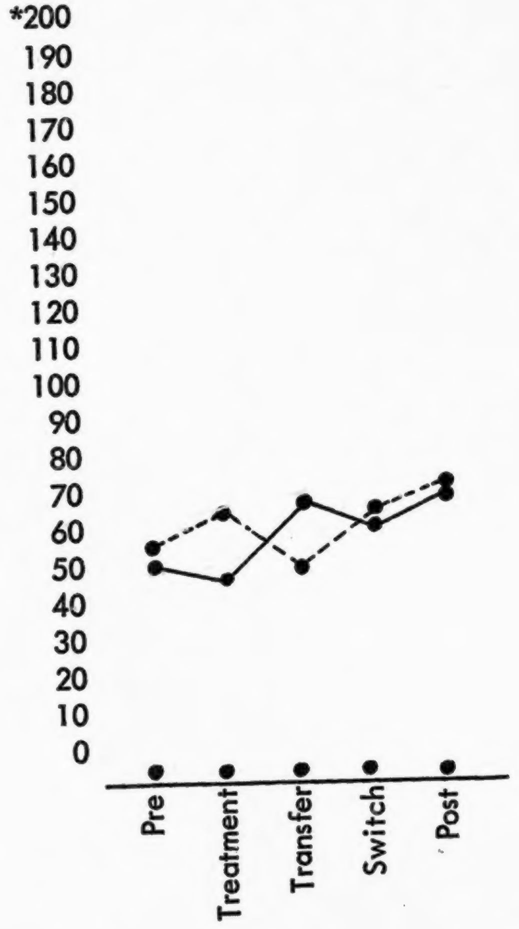
*Means (decimal omitted) on a scale on which 0 = absent, 100 = present, but weak; 200 = present, strongly



C-1 ———————— = Spontaneous Classification
C-2 ---------------- = Divergent Classification

Figure 27: Experiment I: Spontaneous Criteria
Total by Experimental Periods

Factor C



D-1 ———————— = Still-Life Stimulus Set
D-2 ---------------- = Mental Theme Stimulus Set

Figure 28: Experiment I: Spontaneous Criteria
Total by Experimental Periods

Factor D

*Means (decimal omitted) on a scale on which 0 = absent, 100 = present, but weak; 200 = present, strongly

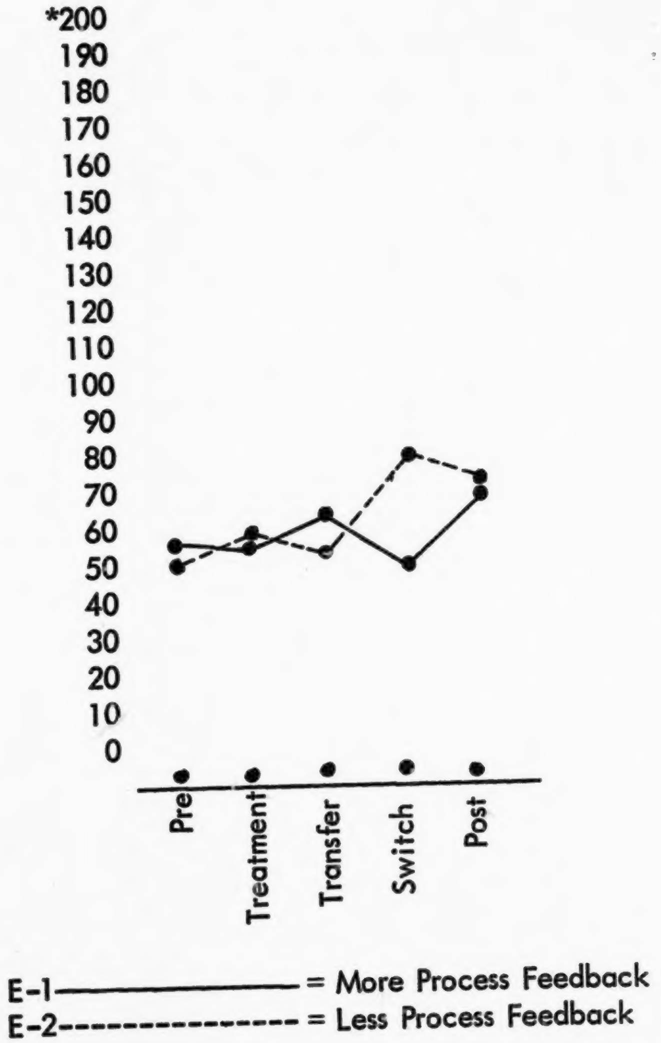


Figure 29: Experiment I: Spontaneous Criteria Total by Experimental Periods

Factor E

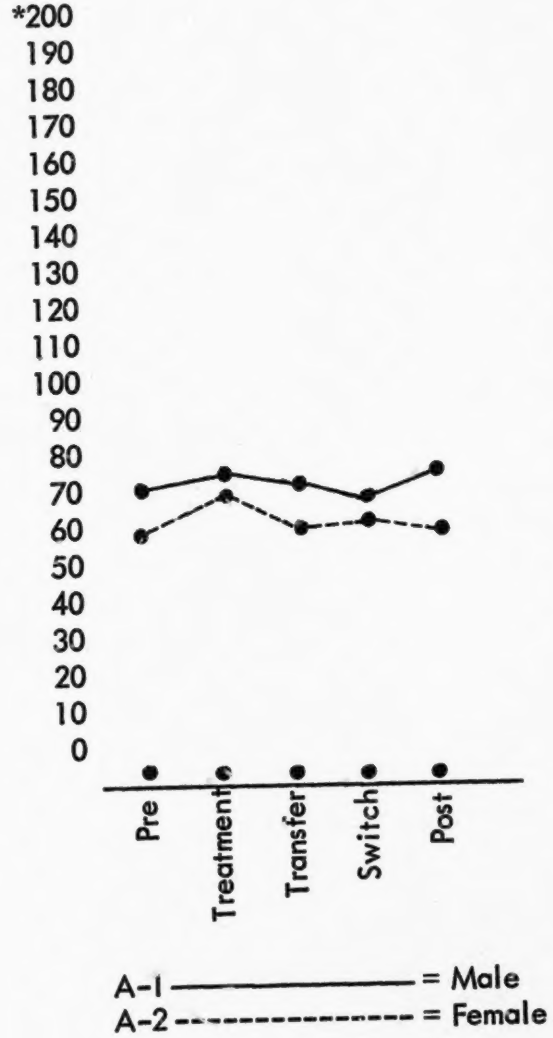
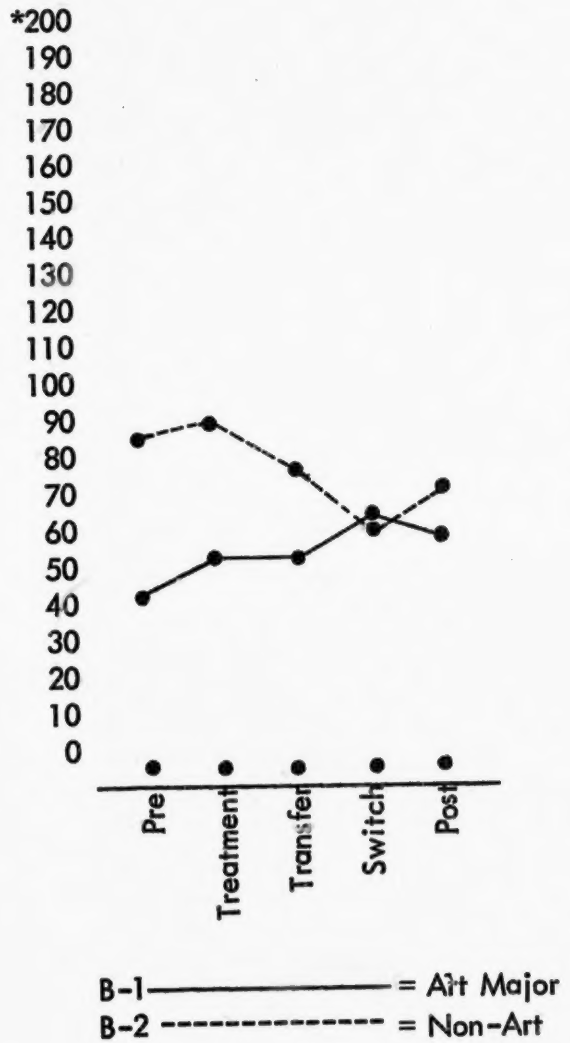


Figure 30: Experiment I: Divergent Criteria Total by Experimental Periods

Factor A

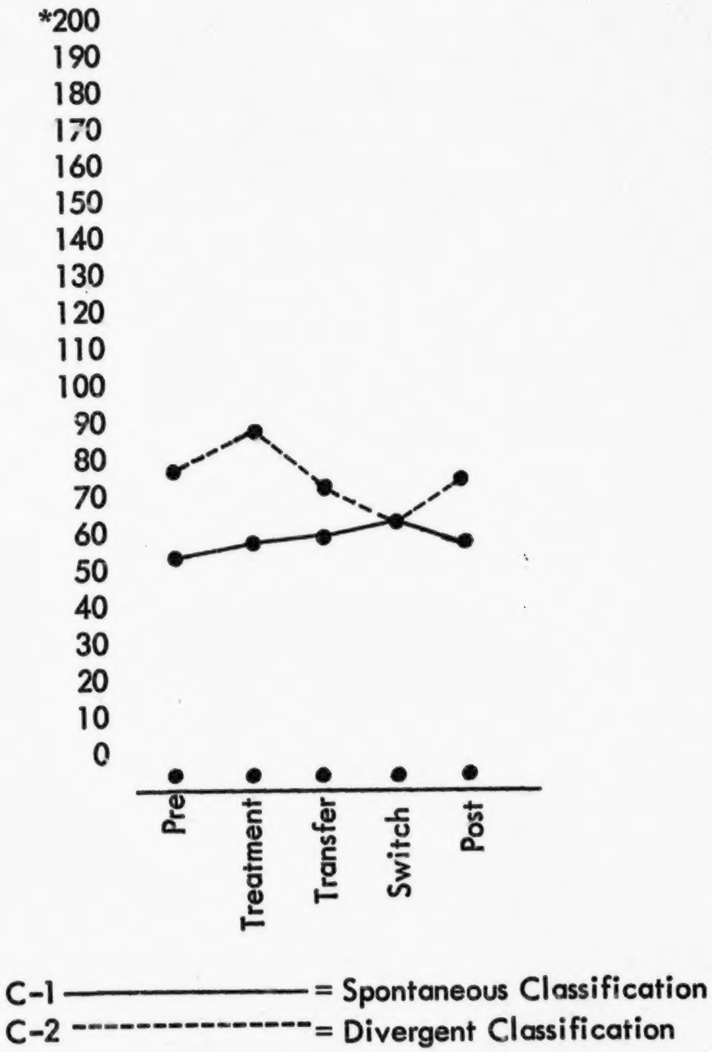
*Means (decimal omitted) on a scale on which 0 = absent, 100 = present, but weak; 200 = present, strongly



B-1 ——————— = Art Major
B-2 -------------- = Non-Art

Figure 31: Experiment I: Divergent Criteria Total by Experimental Periods

Factor B

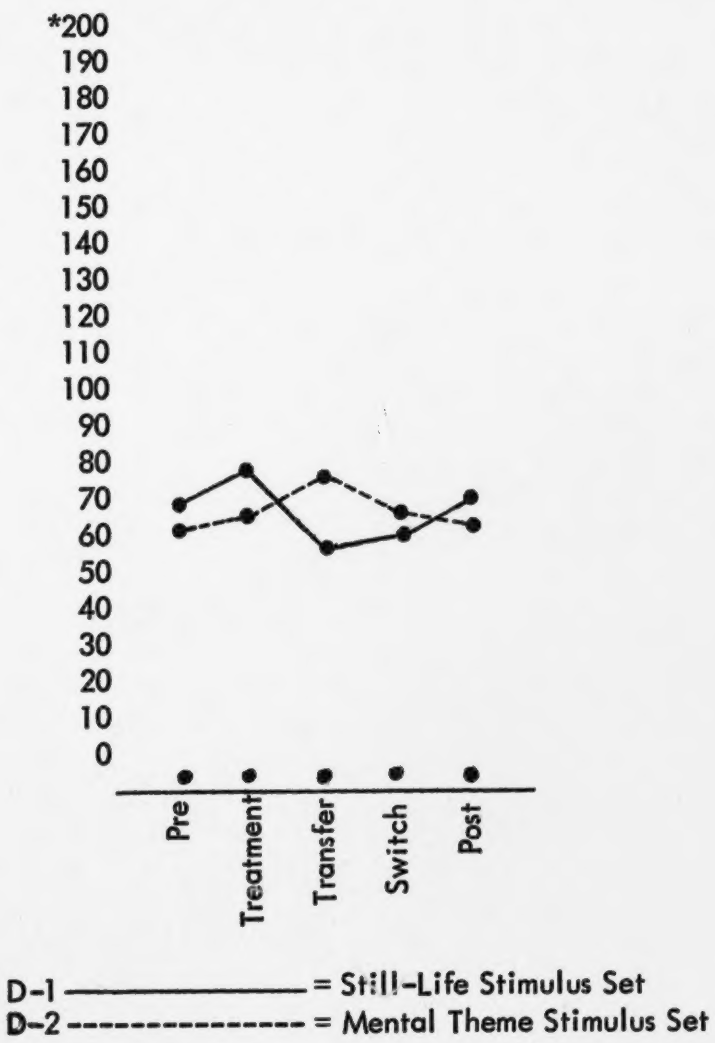


C-1 ——————— = Spontaneous Classification
C-2 --------------- = Divergent Classification

Figure 32: Experiment I: Divergent Criteria Total by Experimental Periods

Factor C

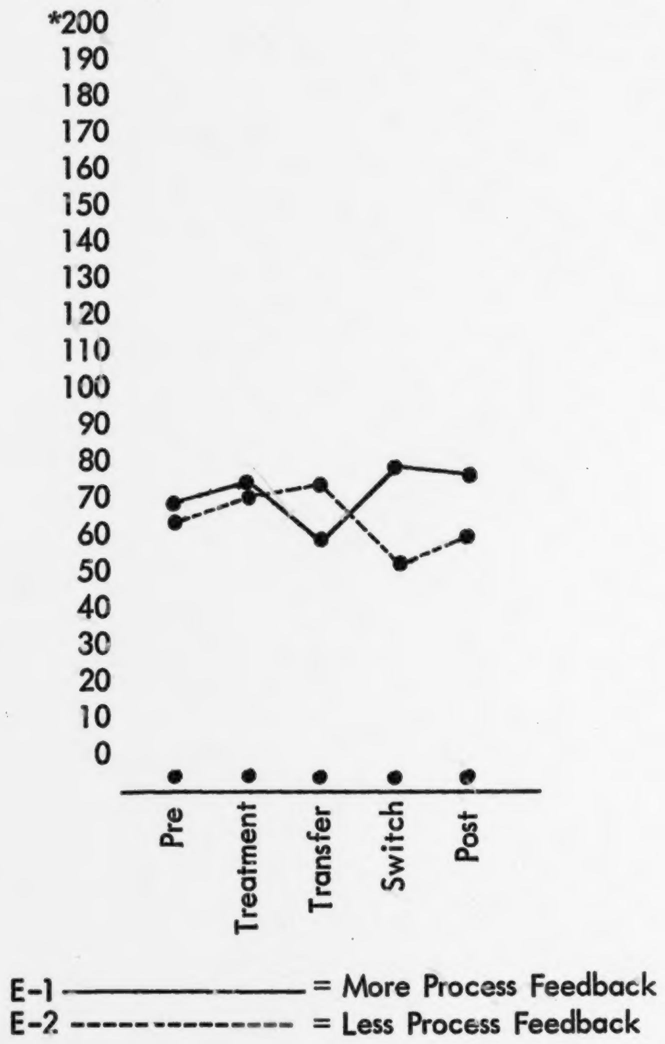
*Means (decimal omitted) on a scale on which 0 = absent, 100 = present, but weak; 200 = present, strongly



D-1 ——————— = Still-Life Stimulus Set
D-2 - - - - - - - - - - = Mental Theme Stimulus Set

Figure 33: Experimental I: Divergent Criteria
Total by Experimental Periods

Factor D



E-1 ——————— = More Process Feedback
E-2 - - - - - - - - - - = Less Process Feedback

Figure 34: Experimental I: Divergent Criteria
Total by Experimental Periods

Factor E

*Means (decimal omitted) on a scale on which 0 = absent, 100 = present, but weak; 200 = present, strongly

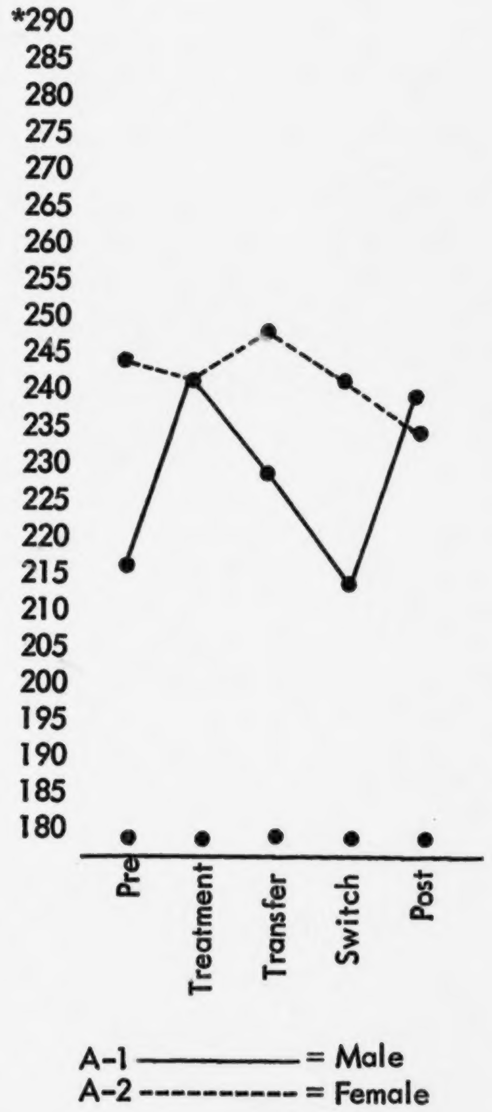


Figure 35: Experiment I: Aesthetic Quality Judgment by Experimental Periods

Factor A

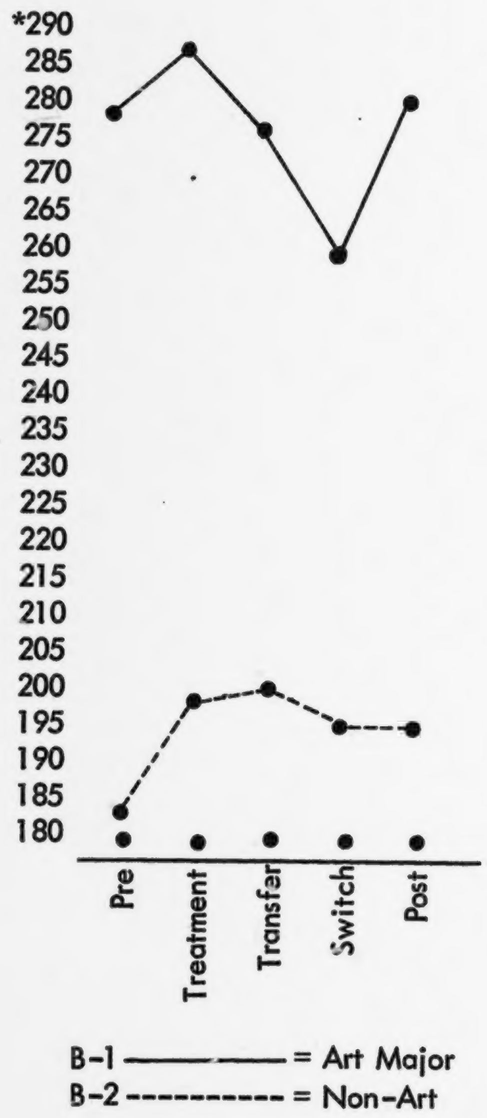
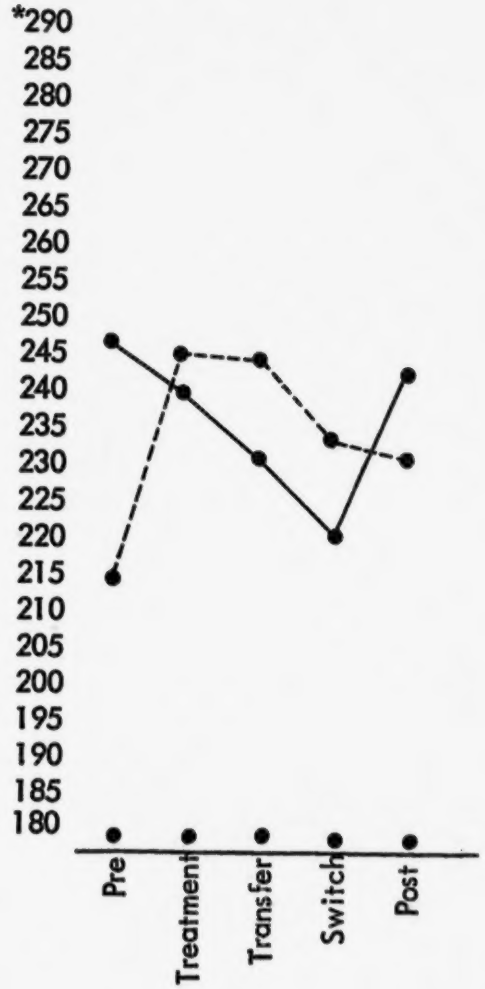


Figure 36: Experiment I: Aesthetic Quality Judgment by Experimental Periods

Factor B

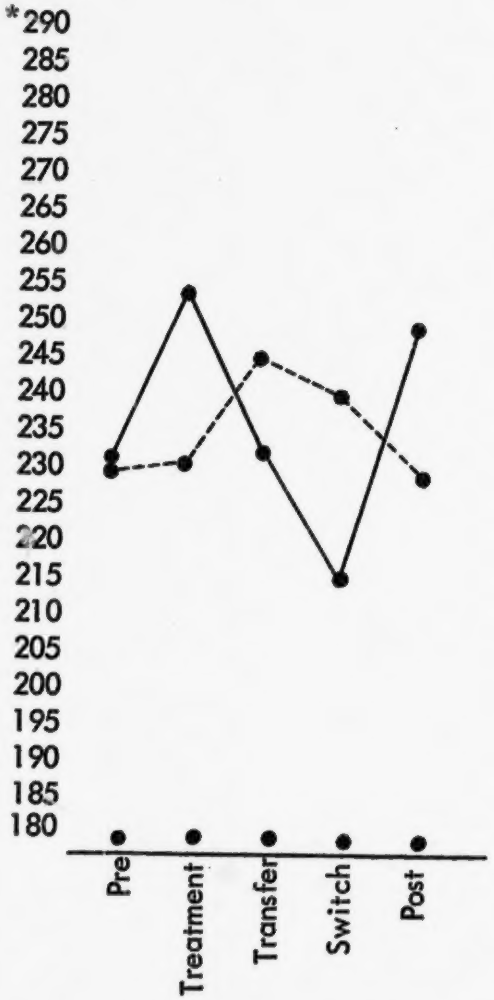
*Means (decimal omitted) for a five point scale.



C-1 ———————— = Spontaneous Classification
C-2 ------------ = Divergent Classification

Figure 37: Experiment I: Aesthetic Quality Judgment by Experimental Periods

Factor C



D-1 ———————— = Still-Life Stimulus Set
D-2 ------------ = Mental Theme Stimulus Set

Figure 38: Experiment I: Aesthetic Quality Judgment by Experimental Periods

Factor D

*Means (decimal omitted) for a five point scale.

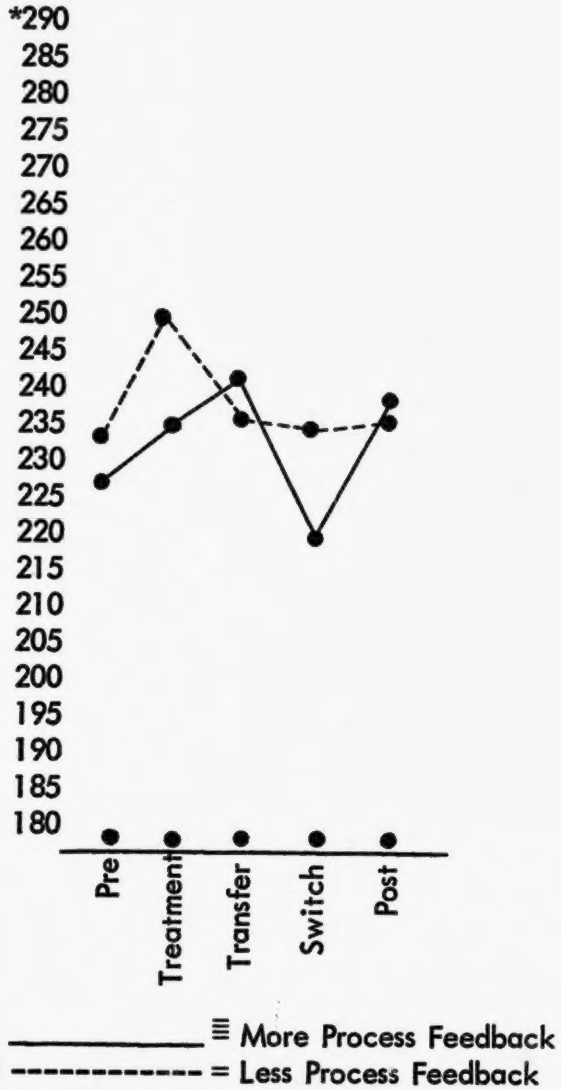
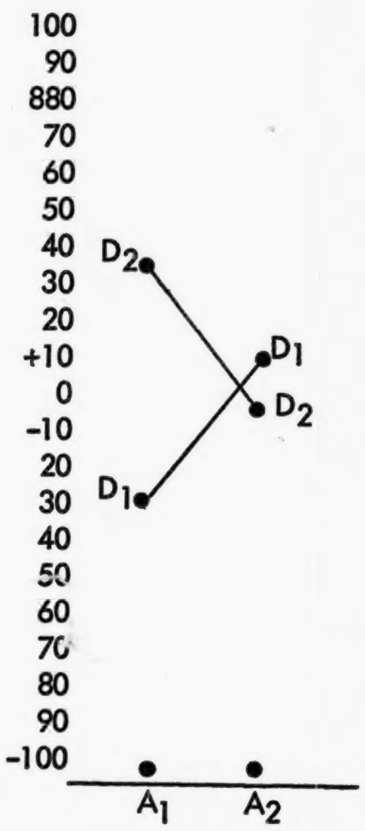


Figure 39: Experiment I: Aesthetic Quality Judgment by Experimental Periods

Factor E

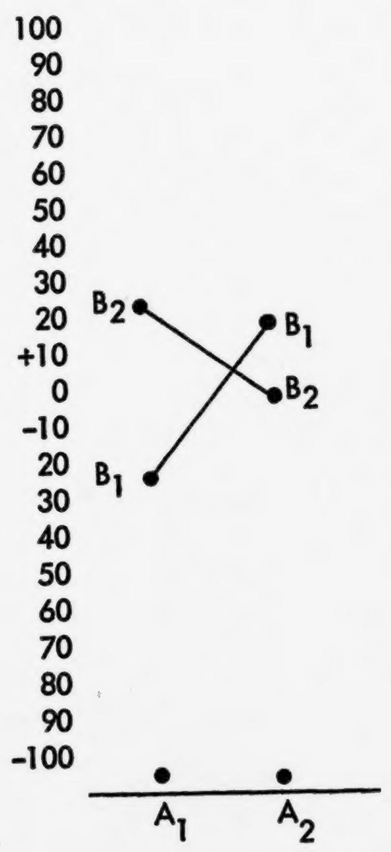
*Means (decimal omitted) for a five point scale.



F at .025 level

Interpretation: Male subjects moving from mental theme to still-life at transfer period go up in divergency, those moving the opposite go down. To a slight degree, the converse is true with female subjects.

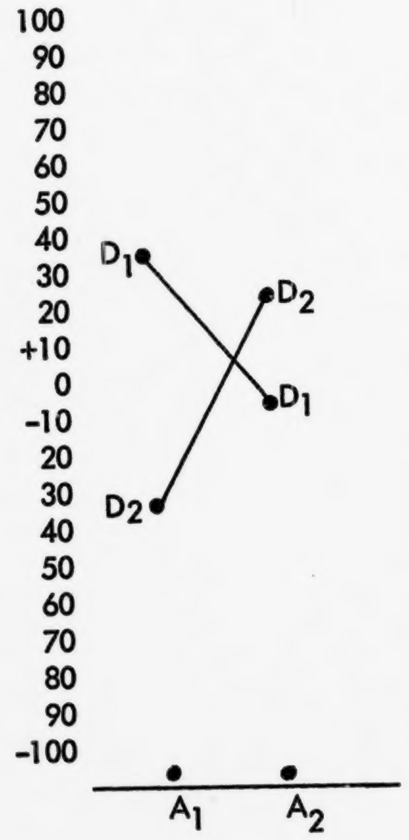
Figure 40: Experiment I: Interaction of Factors A and D on Gains on Divergent Criteria Total at Transfer Period



Interpretation: Male non-art subjects go up in spontaneity at transfer period, male art subjects go down. The converse is true of female subjects.

F at .025 level

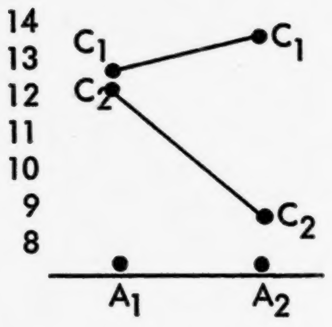
Figure [illegible]1: Experiment I: Interaction of Factors A and B on Gains on Spontaneous Criteria Total at Transfer Period



Interpretation: Male subjects moving from still-life to mental theme go up in spontaneity and those doing the opposite go down. The converse is true with female subjects, but to a slighter degree.

F at .005 level

Figure 42 : Experiment I: Interaction of Factors A and D on Gains on Spontaneous Criteria Total at Transfer Period



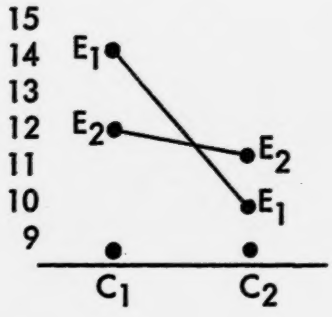
Interpretation: M: S>D
F: S>D

Regardless of sex, S see their work as more active than D, but Males differ only .2, despite strategy, whereas Females differ 4.9 between strategies (this despite the fact that Males of the two strategies are further apart in total S% than Females: 69% to 20%, as opposed to 63% to 36%).

Sex x Strategy Classification

F at .05 level

Figure 43: Experiment I: Interaction:
Total on Osgood Activity Scales
Factors A and C

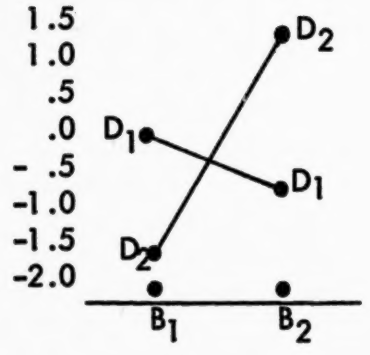


Interpretation: S: FB+>FB-
D: FB->FB+

For those classified Spontaneous, more Feedback increases self-perception of activity in pictures, the reverse being true for those classified Divergent. In general, Spontaneous see more activity than Divergents (F at .01).

Strategy Classification x Feedback
F at .05 level

Figure 44: Experiment I: Interaction:
Total on Osgood Activity Scales
Factors C and E [redacted]



Interpretation: A: S-L > Md
NA: Md > S-L

Art students see their stages as more flexible when working from the Still-Life, the reverse is true for Non-Art (who generally reported more flexibility in their stages, thus reversing an earlier hunch from a pilot study).

Art Training x Stimulus Set

F at .05 level

Figure 45: Experiment I: Interaction: Flexibility of Perceived Process Stages, Factors B and D

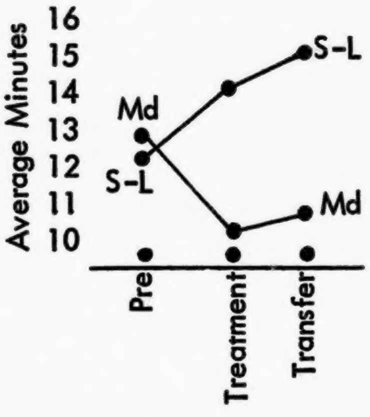
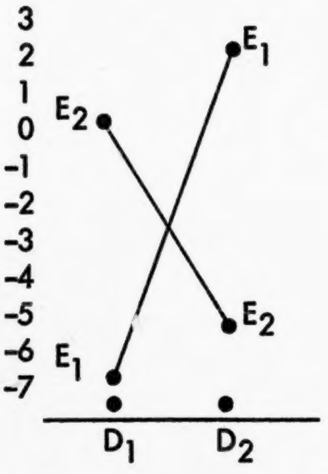


Figure 46: Experiment I: Effect of Stimulus Set on Time in Minutes

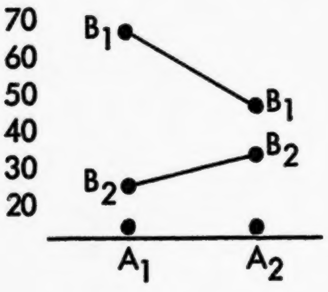


Interpretation: S-L: FB- >FB+
Md: FB+ >FB-

Those working from the Still-Life with less process feedback saw their work more as improving; but those working from Mind saw more improvement under more process feedback.

Stimulus Set x Feedback
F at .05 level

Figure 47: Experiment I: Interaction: Gains on Osgood Evaluative Scales during Treatment Factors D and E



Interpretation: regardless of sex, Art S's are more spontaneous at start than Non-Art, but males differ greatly on the training factor in S% (43%) whereas females are closer (only 13% apart regardless of art training).

Sex x Art Training
F at .05 level

Figure 48: Experiment I: Interaction: S% at Pre, Factors A and B

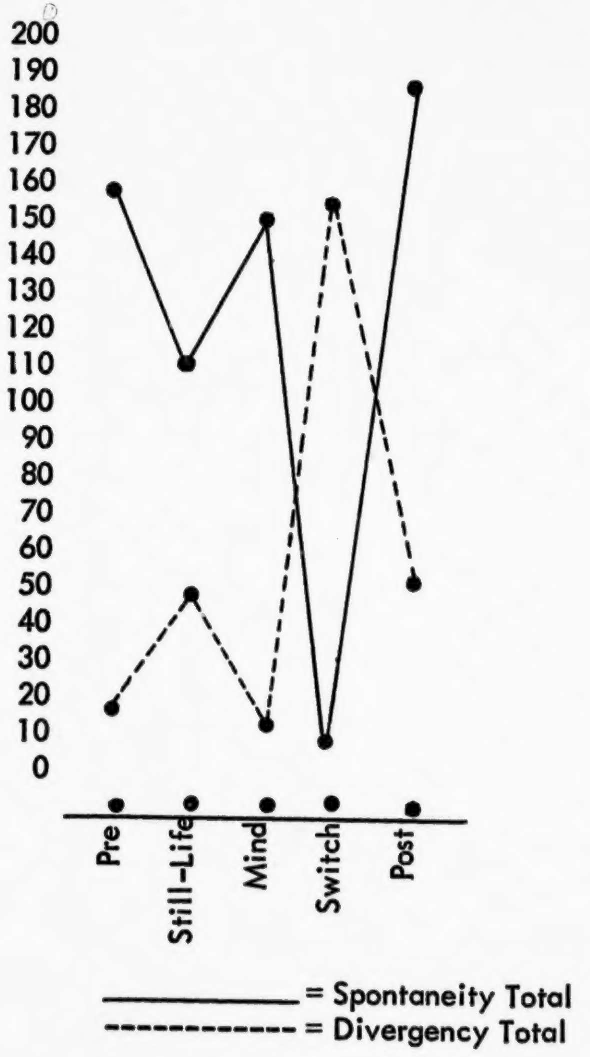


Figure 49: Experiment I: Variability of Style of an Art, Female Subject Classified as Spontaneous on S and D Criteria Totals

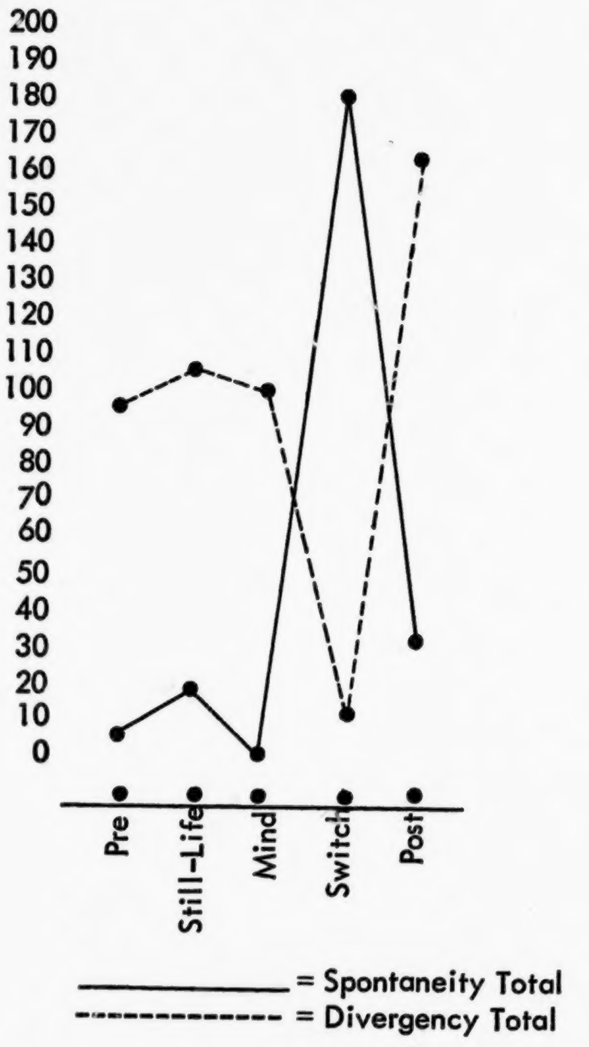


Figure 50: Experiment I: Variability of Style of an Art, Female Subject Classified as Divergent on S and D Criteria Totals

*Means (decimal omitted) on a scale on which 0 = absent, 100 = present, but weak; 200 = present, strongly

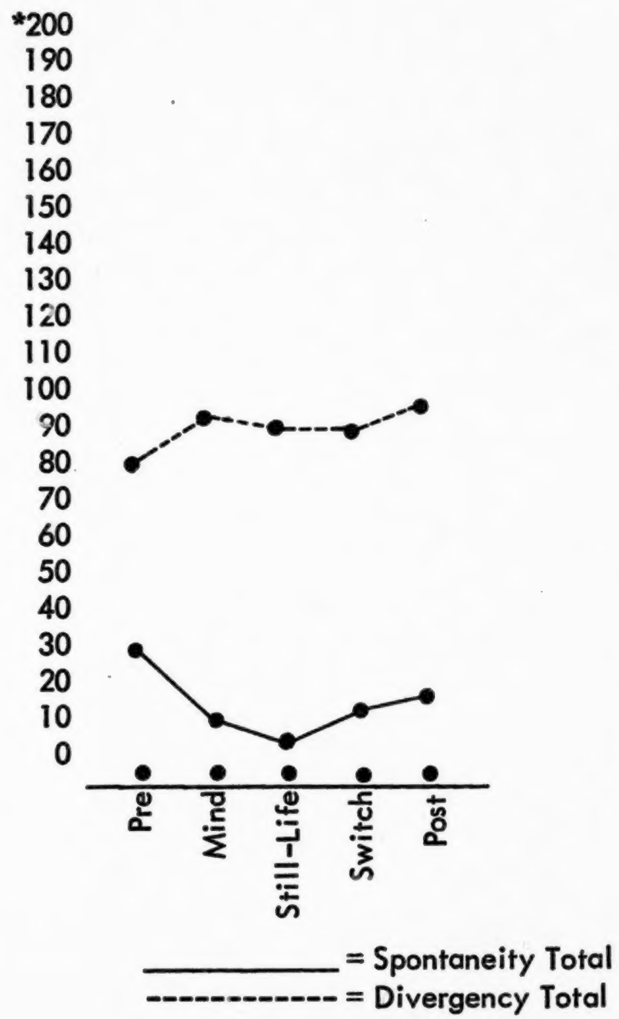


Figure 51: Experiment I: Variability of Style of a Non-Art, Male Subject Classified as Spontaneous on S and D Criteria Totals

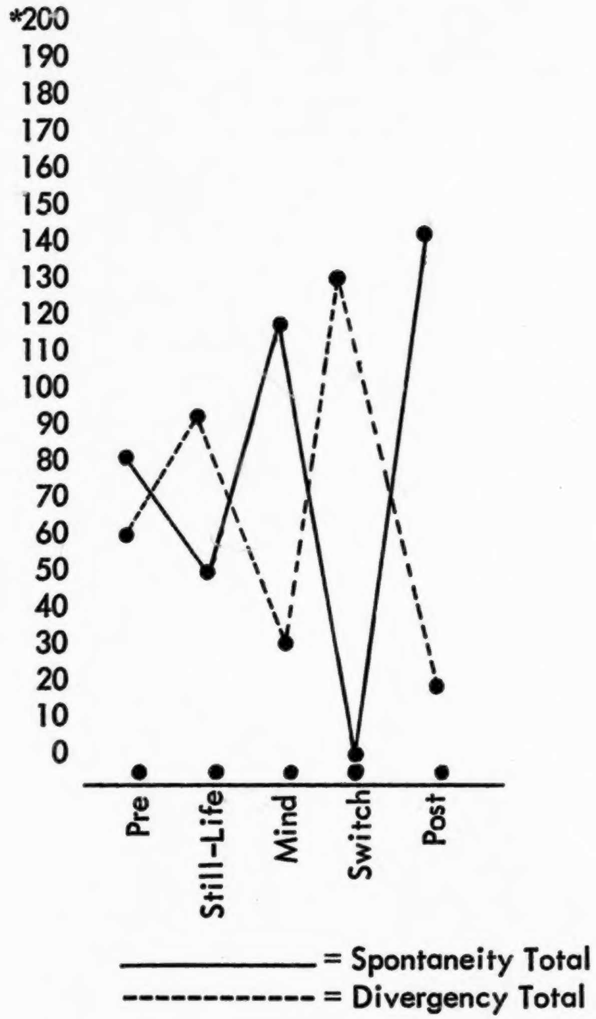


Figure 52: Experiment I: Variability of Style of an Art, Male Subject Classified as Spontaneous on S and D Criteria Totals

*Means (decimal omitted) on a scale on which 0 = absent, 100 = present, but weak; 200 = present, strongly

Table XXXIV

Experiment I: Relationships between Aesthetic Quality, Spontaneity, and Divergency Totals for the First Six Drawing Periods (Pre, Treatment and Transfer) and Art Experience Index (Burgart's)

	(1) AQ	(2) AEI	(3) S
(2) AEI	.539		
(3) S	.662	.663	
(4) D	-.538	-.367	-.759

(1) AQ = Aesthetic Quality
(2) AEI = Art Experience Index (Burgart's)
(3) S = Spontaneous Strategy Score
(4) D = Divergent Strategy Score

Partial correlations with (2) AEI held constant

$r_{13.2}$ = .468 (as opposed to r_{13} = .662)
$r_{14.2}$ = -.436 (as opposed to r_{14} = -.538)
$r_{34.2}$ = -.739 (as opposed to r_{34} = -.759)

Table XXXV

Experiment I: Art Experience Index (Burgart's) in Relation to Strategy Criteria Factors

	D-FI	D-FII	D-FIII
AEI	-.519	-.287	-.365

	S-FI	S-FII	S-FIII
AEI	.662	.675	.671

Table XXXIV

Experiment I: Relationships between Aesthetic Quality, Spontaneity, and Divergency Totals for the First Six Drawing Periods (Pre, Treatment and Transfer) and Art Experience Index (Burgart's)

	(1) AQ	(2) AEI	(3) S
(2) AEI	.539		
(3) S	.662	.663	
(4) D	-.538	-.367	-.759

(1) AQ = Aesthetic Quality
(2) AEI = Art Experience Index (Burgart's)
(3) S = Spontaneous Strategy Score
(4) D = Divergent Strategy Score

Partial correlations with (2) AEI held constant

$r_{13.2}$ = .468 (as opposed to r_{13} = .662)
$r_{14.2}$ = -.436 (as opposed to r_{14} = -.538)
$r_{34.2}$ = -.739 (as opposed to r_{34} = -.759)

Table XXXV

Experiment I: Art Experience Index (Burgart's) in Relation to Strategy Criteria Factors

	D-FI	D-FII	D-FIII
AEI	-.519	-.287	-.365
	S-FI	**S-FII**	**S-FIII**
AEI	.662	.675	.671

Table XXXVI

Experiment I: Relationships between Strategy and Aesthetic Quality on Switch (Simulation of Perceived Opposed Strategy in Period 7)

(1) $r_{AQ3,\ S3} = .662$ $r_{AQ3,\ S\text{-}SW} = .135$ Difference = $-.527$

(2) $r_{AQ3,\ D3} = -.538$ $r_{AQ3,\ D\text{-}SW} = .231$ Difference = $+.769$

(3) $r_{AQ3,\ S3} = .662$ $r_{AQ\text{-}SW,\ S3} = .351$ Difference = $-.311$

(4) $r_{AQ3,\ D3} = -.538$ $r_{AQ\text{-}SW,\ D3} = -.261$ Difference = $+.277$

(5) $r_{AQ3,\ AQ\text{-}Post} = .858$ $r_{AQ3,\ AQ\text{-}Switch} = .605$ Difference = $-.253$

Legend:
AQ3 = Aesthetic Quality over first 6 periods (pre, treatment, and transfer)
S3 = Spontaneity over first 6 periods
D3 = Divergency over first 6 periods
S-SW = Spontaneity on Switch (Simulation of Perceived Opposed Strategy in Period 7)
D-SW = Divergency on Switch
AQ-SW = Aesthetic Quality on Switch
AQ-Post = Aesthetic Quality on Drawings other than Switch in Period 7

Table XXXVII

Experiment I: Total S % of Pictures as
Compared to Original Strategy Classification
(using an S % of 42 as cut-off)
N=32

	Classified as S by Total S %			
	Art		Non-Art	
	R	W	R	W
Originally S	9	0	6	4
Originally D	3	5	7	1

Interpretation: 25 correctly predicted, 10 incorrectly (allowing for the fact that treatments may have influenced change). Note that the errors fall on the art divergents and the non-art spontaneous

Table XXXVIII

Experiment I: Choice of Stimulus for Simulating
Perceived Opposite Strategy (G Week)
N=32 (clear cases)

	Chose Still-Life	Chose Mind
Classified as S	11	6
Classified as D	3	12

P at .01 level

Table XXXIX

Experiment I: Accuracy of Predictions of Total S% of Various Self-Ratings by Subjects at Beginning of Week G

	Accuracy by Percent	r with Self-Rating Total	
		Spontaneous	Divergent
Self-Rating: items	78	.806	.623
Self-Rating: word pairs	74	.852	.755
Self-Rating: Wolfflin Scales	71	.592	.756
Self-Rating: Pictorial Scales	65	.679	.497
Self-Rating: total of above	76		
As classified by pre rating	72		

Table XL

Experiment I: Error in Self-Rating of Strategy as Compared to Pre Classification

	Right	Wrong
1 of 8 Art Spontaneous rated self as D	7	1
6 of 9 Non-Art Spontaneous rated self as D	3	6*
7 of 9 Art Divergents rated self as S	2	7
2 of 8 Non-Art Divergents rated self as S	6	2

*Some non-art spontaneous males were in fact more D than S, but were classified as S because they were most S of this class.

Table XLI

Experiment I: Intercorrelations of Six Rotated Factors of the Eighteen Strategy Criteria

	1	2	3	4	5
2	-0.736				
3	-0.601	0.432			
4	0.766	-0.536	-0.539		
5	0.808	-0.777	-0.552	0.667	
6	-0.879	0.648	0.486	-0.651	-0.850

Appendix B: Supplementary Data Related to Experiment II

Table XLII

Experiment II: Reliability Estimates for Six Strategy Criteria Factors and Aesthetic Quality for Three Trained Art Judges

Variable	Low (Average Inter-judge Agreement)	High (Average of Judges with Judge Total)	$r_{\bar{a}\bar{a}}$*
S1	.723	.902	.887
S2	.749	.911	.900
S3	.710	.879	.880
D1	.870	.956	.953
D2	.895	.964	.962
D3	.812	.935	.928
AQ	.760	.915	.905

$$*r_{\bar{a}\bar{a}} = \frac{a r_{11}}{1 + (a-1)\, r_{11}}$$

a = number of raters
r_{11} = average inter-judge agreement

Table XLIII

Experiment II: Analysis of Variance Table Treatment Gains on Total of Spontaneous Factor Cluster Judgments

Source of Variation[1]	Degrees of Freedom	Sum of Squares	Mean Squares	F-Ratio	Probability
A	1	0.1800	0.1800	-----	------
B	1	0.6050	0.6050	1.751	.25
AB	1	0.8450	0.8450	2.446	.25
C	1	3.0013	3.0013	8.689	.05
AC	1	0.0313	0.0313	-----	------
BC	1	0.0613	0.0613	-----	------
ABC	1	1.0513	1.0513	3.043	.25
D	1	23.4613	23.4613	67.920	.005
AD	1	0.3613	0.3613	1.046	------
BD	1	0.1013	0.1013	-----	------
CD	1	0.0050	0.0050	-----	------
E	1	0.2450	0.2450	-----	------
AE	1	0.1250	0.1250	-----	------
BE	1	0.5000	0.5000	1.448	------
CE	1	0.1513	0.1513	-----	------
DE	1	0.0313	0.0313	-----	------
Within[2]	6	2.0725	0.3454	-----	------
Total	31	33.8150	------	-----	------

---

[1] Three factor interactions are shown only where the F-Ratio attains a probability of at least .25.

[2] The Within or Error figure includes the five four factor interactions.

Table XLIV

Experiment II: Analysis of Variance Table
Post Gains on Total of Spontaneous
Factor Cluster Judgments

Source of Variation[1]	Degrees of Freedom	Sum of Squares	Mean Squares	F-Ratio	Probability
A	1	0.0000	0.0000	-----	------
B	1	1.7113	1.7113	1.664	.25
AB	1	0.9113	0.9113	-----	------
C	1	3.7813	3.7813	3.678	.25
AC	1	0.0613	0.0613	-----	------
BC	1	0.6050	0.6050	-----	------
D	1	14.5800	14.5800	14.180	.01
AD	1	0.0200	0.0200	-----	------
BD	1	0.6613	0.6613	-----	------
CD	1	1.7113	1.7113	1.664	.25
BCD	1	2.0000	2.0000	1.945	.25
E	1	0.7200	0.7200	-----	------
AE	1	0.2450	0.2450	-----	------
BE	1	0.3613	0.3613	-----	------
CE	1	0.2813	0.2813	-----	------
DE	1	0.3200	0.3200	-----	------
Within[2]	6	6.1725	1.0288	-----	------
Total	31	37.4600	------	-----	------

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[1] Three factor interactions are shown only where the F-Ratio attains a probability of at least .25.

[2] The Within or Error figure includes the five four factor interactions.

Table XLV

Experiment II: Analysis of Variance Table
Treatment Gains on Total of Divergent
Factor Cluster Judgments

Source of Variation[1]	Degrees of Freedom	Sum of Squares	Mean Squares	F-Ratio	Probability
A	1	1.0513	1.0513	1.458	------
B	1	0.2113	0.2113	-----	------
AB	1	2.5313	2.5313	3.511	.25
C	1	6.4800	6.4800	8.988	.025
AC	1	0.6050	0.6050	-----	------
BC	1	0.5000	0.5000	-----	------
ABC	1	1.8050	1.8050	2.504	.25
D	1	34.8613	34.8613	48.353	.005
AD	1	0.5513	0.5513	-----	------
BD	1	0.1513	0.1513	-----	------
CD	1	0.0050	0.0050	-----	------
E	1	0.0013	0.0013	-----	------
AE	1	0.5513	0.5513	-----	------
BE	1	1.0513	1.0513	1.458	------
CE	1	0.0450	0.0450	-----	------
DE	1	0.1013	0.1013	-----	------
Within[2]	6	4.3263	0.7210	-----	------
Total	31	56.1088	------	-----	------

---

[1] Three factor interactions are shown only where the F-Ratio attains a probability of at least .25.

[2] The Within or Error figure includes the five four factor interactions.

Table XLVI

Experiment II: Analysis of Variance Table
Post Gains on Total of Divergent
Factor Cluster Judgments

Source of Variation[1]	Degrees of Freedom	Sum of Squares	Mean Squares	F-Ratio	Probability
A	1	0.1953	0.1953	-----	------
B	1	1.0878	1.0878	1.531	------
AB	1	1.4028	1.4028	1.974	.25
C	1	1.7578	1.7578	2.473	.25
AC	1	0.6903	0.6903	-----	------
BC	1	0.4753	0.4753	-----	------
ABC	1	2.9403	2.9403	4.137	.10
D	1	21.9453	21.9453	30.877	.005
AD	1	0.6328	0.6328	-----	------
BD	1	1.7578	1.7578	2.473	.25
CD	1	0.5253	0.5253	-----	------
E	1	0.3403	0.3403	-----	------
AE	1	1.0878	1.0878	1.531	------
BE	1	0.3003	0.3003	-----	------
CE	1	0.0378	0.0378	-----	------
DE	1	0.5778	0.5778	-----	------
Within[2]	6	4.2644	0.7107	-----	------
Total	31	42.8972	------	-----	------

---

[1] Three factor interactions are shown only where the F-Ratio attains a probability of at least .25.

[2] The Within or Error figure includes the five four factor interactions.

Table XLVII

Experiment II: Analysis of Variance Table
Treatment Gains on Aesthetic Quality Judgment

Source of Variation[1]	Degrees of Freedom	Sum of Squares	Mean Squares	F-Ratio	Probability
A	1	0.1128	0.1128	-----	------
B	1	0.3003	0.3003	-----	------
AB	1	0.1953	0.1953	-----	------
C	1	0.0003	0.0003	-----	------
AC	1	1.0153	1.0153	1.332	------
BC	1	0.7503	0.7503	-----	------
D	1	0.8778	0.8778	1.151	------
AD	1	1.0153	1.0153	1.332	------
BD	1	0.7503	0.7503	-----	------
CD	1	0.0153	0.0153	-----	------
ABD	1	1.3203	1.3203	1.732	.25
E	1	0.4278	0.4278	-----	------
AE	1	2.4753	2.4753	3.247	.25
BE	1	0.0528	0.0528	-----	------
CE	1	0.1128	0.1128	-----	------
DE	1	0.2628	0.2628	-----	------
Within[2]	6	4.5744	0.7624	-----	------
Total	31	17.9997	------		

---

[1] Three factor interactions are shown only where the F-Ratio attains a probability of at least .25.

[2] The Within or Error figure includes the five four factor interactions.

Table XLVIII

Experiment II: Analysis of Variance Table
Post Gains on Aesthetic Quality Judgment

Source of Variation[1]	Degrees of Freedom	Sum of Squares	Mean Squares	F-Ratio	Probability
A	1	0.6613	0.6613	4.723	.10
B	1	0.1013	0.1013	-----	------
AB	1	1.9013	1.9013	13.661	.025
C	1	0.4050	0.4050	2.893	.25
AC	1	0.8450	0.8450	6.036	.05
BC	1	0.3200	0.3200	2.286	.25
ABC	1	0.5000	0.5000	3.571	.25
D	1	0.2113	0.2113	1.509	------
AD	1	0.3613	0.3613	2.580	.25
BD	1	0.0313	0.0313	-----	------
CD	1	0.0050	0.0050	-----	------
ACD	1	0.7200	0.7200	5.143	.10
BCD	1	0.7200	0.7200	5.143	.10
E	1	0.7200	0.7200	5.143	.10
AE	1	0.3200	0.3200	2.286	.25
BE	1	0.2450	0.2450	1.750	.25
CE	1	0.0113	0.0113	-----	------
DE	1	0.5000	0.5000	3.571	.25
ABE	1	0.2450	0.2450	1.750	.25
CDE	1	0.7813	0.7813	5.580	.10
Within[2]	6	0.8400	0.1400	-----	------
Total	31	10.6088	------	-----	------

---

[1] Three factor interactions are shown only where the F-Ratio attains a probability of at least .25.

[2] The Within or Error figure includes the five four factor interactions.

Table XLIX

Experiment II: Analysis of Variance Table
Treatment Gains on Spontaneous Criteria
Factor Cluster I Judgment

Source of Variation[1]	Degrees of Freedom	Sum of Squares	Mean Squares	F-Ratio	Probability
A	1	0.3828	0.3828	1.294	------
B	1	0.4278	0.4278	1.446	------
AB	1	1.5753	1.5753	5.330	.10
C	1	3.0628	3.0628	10.355	.025
AC	1	0.0903	0.0903	-----	------
BC	1	0.1378	0.1378	-----	------
ABC	1	1.1628	1.1628	3.931	.10
D	1	28.3128	28.3128	95.726	.005
AD	1	0.1378	0.1378	-----	------
BD	1	1.0153	1.0153	3.433	.25
CD	1	0.0003	0.0003	-----	------
BCD	1	0.5778	0.5778	1.954	.25
E	1	0.3003	0.3003	1.015	------
AE	1	0.0003	0.0003	-----	------
BE	1	0.6903	0.6903	2.334	.25
CE	1	0.3828	0.3828	1.294	------
DE	1	0.1953	0.1953	-----	------
BCE	1	0.6328	0.6328	2.140	.25
Within[2]	6	1.7744	0.2957	-----	------
Total	31	41.3872	-------	-----	------

---

[1] Three factor interactions are shown only where the F-Ratio attains a probability of at least .25.

[2] The Within or Error figure includes the five four factor interactions.

Table L

Experiment II: Analysis of Variance Table
Post Gains on Spontaneous Criteria
Factor Cluster I Judgement

Source of Variation[1]	Degrees of Freedom	Sum of Squares	Mean Squares	F-Ratio	Probability
A	1	0.1013	0.1013	-----	------
B	1	1.3613	1.3613	1.399	------
AB	1	0.7813	0.7813	-----	------
C	1	6.3013	6.3013	6.478	.05
AC	1	0.1013	0.1013	-----	------
BC	1	0.1013	0.1013	-----	------
D	1	18.0000	18.0000	18.504	.01
AD	1	0.0800	0.0800	-----	------
BD	1	2.0000	2.0000	2.056	.25
CD	1	0.7200	0.7200	-----	------
E	1	2.2050	2.2050	2.267	.25
AE	1	0.7200	0.7200	-----	------
BE	1	0.6050	0.6050	-----	------
CE	1	0.2450	0.2450	-----	------
DE	1	1.3613	1.3613	1.399	------
Within[2]	6	5.8350	.9725	-----	------
Total	31	46.0588	------	-----	------

---

[1] Three factor interactions are shown only where the F-Ratio attains a probability of at least .25.

[2] The Within or Error figure includes the five four factor interactions.

Table LI

Experiment II: Analysis of Variance Table
Treatment Gains on Spontaneous Criteria
Factor Cluster II Judgment

Source of Variation[1]	Degrees of Freedom	Sum of Squares	Mean Squares	F-Ratio	Probability
A	1	0.4513	0.4513	-----	------
B	1	0.7813	0.7813	1.707	.25
AB	1	2.3113	2.3113	5.050	.10
C	1	3.3800	3.3800	7.385	.05
AC	1	0.1800	0.1800	-----	------
BC	1	0.1800	0.1800	-----	------
ABC	1	2.6450	2.6450	5.780	.10
D	1	24.8513	24.8513	54.300	.005
AD	1	1.0513	1.0513	2.297	.25
BD	1	0.1513	0.1513	-----	------
CD	1	0.1800	0.1800	-----	------
E	1	0.2113	0.2113	-----	------
AE	1	0.0613	0.0613	-----	------
BE	1	0.2813	0.2813	-----	------
CE	1	0.1250	0.1250	-----	------
DE	1	0.1513	0.1513	-----	------
Within[2]	6	2.7463	0.4577	-----	------
Total	31	40.9488	------	-----	------

---

[1] Three factor interactions are shown only where the F-Ratio attains a probability of at least .25.

[2] The Within or Error figure includes the five four factor interactions.

Table LII

Experiment II: Analysis of Variance Table
Post Gains on Spontaneous Criteria
Factor Cluster II Judgment

Source of Variation[1]	Degrees of Freedom	Sum of Squares	Mean Squares	F-Ratio	Probability
A	1	0.0800	0.0800	-----	------
B	1	2.0000	2.0000	1.728	.25
AB	1	2.4200	2.4200	2.091	.25
C	1	0.9800	0.9800	-----	------
AC	1	0.0000	0.0000	-----	------
BC	1	1.4450	1.4450	1.249	------
ABC	1	2.4200	2.4200	2.091	.25
D	1	14.3113	14.3113	12.368	.025
AD	1	0.3613	0.3613	-----	------
BD	1	1.9013	1.9013	1.643	.25
CD	1	0.5513	0.5513	-----	------
BCD	1	1.9013	1.9013	1.643	.25
E	1	0.5513	0.5513	-----	------
AE	1	0.2113	0.2113	-----	------
BE	1	0.6613	0.6613	-----	------
CE	1	0.2113	0.2113	-----	------
DE	1	0.1250	0.1250	-----	------
Within[2]	6	6.9425	1.1570	-----	------
Total	31	41.8750	------	-----	------

---

[1] Three factor interactions are shown only where the F-Ratio attains a probability of at least .25.

[2] The Within or Error figure includes the five four factor interactions.

Table LIII

Experiment II: Analysis of Variance Table
Treatment Gains on Spontaneous Criteria
Factor Cluster III Judgment

Source of Variation[1]	Degrees of Freedom	Sum of Squares	Mean Squares	F-Ratio	Probability
A	1	0.0378	0.0378	-----	------
B	1	0.5778	0.5778	-----	------
AB	1	0.0528	0.0528	-----	------
C	1	2.3653	2.3653	4.085	.10
AC	1	0.2278	0.2278	-----	------
BC	1	0.0003	0.0003	-----	------
D	1	20.3203	20.3203	35.093	.005
AD	1	0.1128	0.1128	-----	------
BD	1	0.0003	0.0003	-----	------
CD	1	0.5778	0.5778	-----	------
E	1	0.1653	0.1653	-----	------
AE	1	0.4278	0.4278	-----	------
BE	1	0.1953	0.1953	-----	------
CE	1	0.0703	0.0703	-----	------
DE	1	0.3003	0.3003	-----	------
Within[2]	6	3.4744	0.5791	-----	------
Total	31	30.0122	------	-----	------

---

[1] Three factor interactions are shown only where the F-Ratio attains a probability of at least .25.

[2] The Within or Error figure includes the five four factor interactions.

Table LIV

Experiment II: Analysis of Variance Table
Post Gains on Spontaneous Criteria
Factor Cluster III Judgment

Source of Variation[1]	Degrees of Freedom	Sum of Squares	Mean Squares	F-Ratio	Probability
A	1	0.0200	0.0200	-----	------
B	1	1.9013	1.9013	1.773	.25
AB	1	0.2813	0.2813	-----	------
C	1	4.6513	4.6513	4.338	.10
AC	1	1.2013	1.2013	1.120	------
BC	1	0.5000	0.5000	-----	------
D	1	13.5200	13.5200	12.608	.025
AD	1	0.4050	0.4050	-----	------
BD	1	0.0313	0.0313	-----	------
CD	1	4.9613	4.9613	4.627	.10
BCD	1	2.4200	2.4200	2.257	.25
E	1	0.1013	0.1013	-----	------
AE	1	0.2813	0.2813	-----	------
BE	1	0.0000	0.0000	-----	------
CE	1	0.7200	0.7200	-----	------
DE	1	0.2113	0.2113	-----	------
Within[2]	6	6.4337	1.0722	-----	------
Total	31	41.1350	------	-----	------

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[1] Three factor interactions are shown only where the F-Ratio attains a probability of at least .25.

[2] The Within or Error figure includes the five four factor interactions.

Table LV

Experiment II: Analysis of Variance Table
Treatment Gains on Divergent Criteria
Factor Cluster I Judgment

Source of Variation[1]	Degrees of Freedom	Sum of Squares	Mean Squares	F-Ratio	Probability
A	1	0.7200	0.7200	-----	------
B	1	1.2800	1.2800	1.588	------
AB	1	4.8050	4.8050	5.963	.10
C	1	4.0613	4.0613	5.040	.10
AC	1	0.3613	0.3613	-----	------
BC	1	0.5513	0.5513	-----	------
ABC	1	1.3613	1.3613	1.689	.25
D	1	45.6013	45.6013	56.591	.005
AD	1	0.2113	0.2113	-----	------
BD	1	0.4513	0.4513	-----	------
CD	1	0.0450	0.0450	-----	------
E	1	0.0013	0.0013	-----	------
AE	1	0.0613	0.0613	-----	------
BE	1	0.1013	0.1013	-----	------
CE	1	0.1250	0.1250	-----	------
DE	1	0.0450	0.0450	-----	------
Within[2]	6	4.8338	0.8056	-----	------
Total	31	66.5400	------	-----	------

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[1] Three factor interactions are shown only where the F-Ratio attains a probability of at least .25.

[2] The Within or Error figure includes the five four factor interactions.

Table LVI

Experiment II: Analysis of Variance Table
Post Gains on Divergent Criteria
Factor Cluster I Judgment

Source of Variation[1]	Degrees of Freedom	Sum of Squares	Mean Squares	F-Ratio	Probability
A	1	0.0153	0.0153	-----	------
B	1	2.5878	2.5878	2.728	.25
AB	1	2.8203	2.8203	2.973	.25
C	1	4.1328	4.1328	4.356	.10
AC	1	1.5753	1.5753	1.660	.25
BC	1	3.1878	3.1878	3.360	.25
ABC	1	1.5753	1.5753	1.660	.25
D	1	26.8278	26.8278	28.277	.005
AD	1	0.2628	0.2628	-----	------
BD	1	2.2578	2.2578	2.380	.25
CD	1	1.2403	1.2403	1.307	------
E	1	0.0153	0.0153	-----	------
AE	1	1.6653	1.6653	1.755	.25
BE	1	0.0378	0.0378	-----	------
CE	1	0.0528	0.0528	-----	------
DE	1	0.5778	0.5778	-----	------
Within[2]	6	5.6919	0.9487	-----	------
Total	31	57.0072	------	-----	------

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[1] Three factor interactions are shown only where the F-Ratio attains a probability of at least .25.

[2] The Within or Error figure includes the five four factor interactions.

Table LVII

Experiment II: Analysis of Variance Table
Treatment Gains on Divergent Criteria
Factor Cluster II Judgment

Source of Variation[1]	Degrees of Freedom	Sum of Squares	Mean Squares	F-Ratio	Probability
A	1	0.8778	0.8778	1.109	------
B	1	0.0703	0.0703	-----	------
AB	1	0.8128	0.8128	1.027	------
C	1	8.3028	8.3028	10.486	.025
AC	1	1.0878	1.0878	1.374	------
BC	1	0.3003	0.3003	-----	------
D	1	33.8253	33.8253	42.721	.005
AD	1	1.9503	1.9503	2.463	.25
BD	1	1.4028	1.4028	1.772	.25
CD	1	0.9453	0.9453	1.194	------
E	1	0.0703	0.0703	-----	------
AE	1	1.4028	1.4028	1.772	.25
BE	1	2.3653	2.3653	2.987	.25
CE	1	0.3003	0.3003	-----	------
DE	1	0.5778	0.5778	-----	------
BDE	1	1.8528	1.8528	2.340	.25
Within[2]	6	4.7494	0.7916	-----	------
Total	31	64.5422	------	-----	------

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[1] Three factor interactions are shown only where the F-Ratio attains a probability of at least .25.

[2] The Within or Error figure includes the five four factor interactions.

Table LVIII

Experiment II: Analysis of Variance Table
Post Gains on Divergent Criteria
Factor Cluster II Judgment

Source of Variation[1]	Degrees of Freedom	Sum of Squares	Mean Squares	F-Ratio	Probability
A	1	1.5753	1.5753	1.487	------
B	1	0.0078	0.0078	-----	------
AB	1	1.0878	1.0878	1.027	------
C	1	0.0078	0.0078	-----	------
AC	1	1.2403	1.2403	1.171	------
BC	1	0.1653	0.1653	-----	------
ABC	1	5.3628	5.3628	5.064	.10
D	1	19.3753	19.3753	18.294	.01
AD	1	0.5778	0.5778	-----	------
BD	1	2.4753	2.4753	2.337	.25
CD	1	0.1653	0.1653	-----	------
ABD	1	4.1328	4.1328	3.902	.10
E	1	0.8128	0.8128	-----	------
AE	1	0.5778	0.5778	-----	------
BE	1	1.2403	1.2403	1.171	------
CE	1	0.6903	0.6903	-----	------
DE	1	0.8778	0.8778	-----	------
CDE	1	1.7578	1.7578	1.660	.25
Within[2]	6	6.3544	1.0591	-----	------
Total	31	49.3397	------	-----	------

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[1] Three factor interactions are shown only where the F-Ratio attains a probability of at least .25.

[2] The Within or Error figure includes the five four factor interactions.

Table LIX

Experiment II: Analysis of Variance Table
Treatment Gains on Divergent Criteria
Factor Cluster III Judgment

Source of Variation[1]	Degrees of Freedom	Sum of Squares	Mean Squares	F-Ratio	Probability
A	1	0.2450	0.2450	-----	------
B	1	0.4513	0.4513	-----	------
AB	1	1.3613	1.3613	2.702	.25
C	1	13.0050	13.0050	25.814	.005
AC	1	0.0050	0.0050	-----	------
BC	1	0.0613	0.0613	-----	------
D	1	30.8113	30.8113	61.157	.005
AD	1	0.3613	0.3613	-----	------
BD	1	0.0050	0.0050	-----	------
CD	1	0.0613	0.0613	-----	------
E	1	0.2450	0.2450	-----	------
AE	1	0.0050	0.0050	-----	------
BE	1	0.2813	0.2813	-----	------
CE	1	0.0050	0.0050	-----	------
DE	1	0.0013	0.0013	-----	------
Within[2]	6	3.0225	0.5038	-----	------
Total	31	51.7950	------	-----	------

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[1] Three factor interactions are shown only where the F-Ratio attains a probability of at least .25.

[2] The Within or Error figure includes the five four factor interactions.

Table LX

Experiment II: Analysis of Variance Table
Post Gains on Divergent Criteria
Factor Cluster III Judgment

Source of Variation[1]	Degrees of Freedom	Sum of Squares	Mean Squares	F-Ratio	Probability
A	1	0.0450	0.0450	-----	------
B	1	2.2050	2.2050	2.129	.25
AB	1	0.9113	0.9113	-----	------
C	1	2.5313	2.5313	2.444	.25
AC	1	0.1800	0.1800	-----	------
BC	1	0.0800	0.0800	-----	------
ABC	1	2.5313	2.5313	21.673	.005
D	1	22.4450	22.4450	-----	------
AD	1	0.5513	0.5513	-----	------
BD	1	0.7813	0.7813	-----	------
CD	1	0.2450	0.2450	-----	------
E	1	0.9113	0.9113	-----	------
AE	1	1.2800	1.2800	1.236	------
BE	1	0.5000	0.5000	-----	------
CE	1	0.0013	0.0013	-----	------
DE	1	0.5000	0.5000	-----	------
ADE	1	1.7113	1.7113	1.652	.25
Within[2]	6	6.2138	1.0356	-----	------
Total	31	47.3488	------	-----	------

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[1] Three factor interactions are shown only where the F-Ratio attains a probability of at least .25.

[2] The Within or Error figure includes the five four factor interactions.

Table LXI

Experiment II: Means for Spontaneous Criteria Total
Factors I, II, III for Treatment Groups over Time Line

	Weeks						O+A	B+C+D	E	Treatment	Post
	O	A	B	C	D	E	Base	Treatment	Post	Gains*	Gains*
A1	2.66	2.62	2.73	2.80	2.93	2.74	2.64	2.83	2.74	0.19	0.10
A2	2.88	2.79	2.95	2.79	2.85	2.93	2.83	2.87	2.93	0.04	0.10
B1	2.99	3.03	3.05	2.91	2.99	2.88	3.01	2.99	2.88	-0.03	-0.13
B2	2.54	2.38	2.63	2.69	2.79	2.79	2.46	2.71	2.79	0.25	0.33
C1	3.20	3.16	3.09	2.90	2.98	2.94	3.19	2.99	2.94	-0.19	-0.24
C2	2.33	2.24	2.59	2.69	2.81	2.73	2.28	2.70	2.73	0.42	0.44
D1	2.91	2.79	3.66	3.79	3.98	3.62	2.84	3.81	3.62	0.97	0.78
D2	2.63	2.62	2.02	1.80	1.81	2.05	2.63	1.88	2.05	-0.74	-0.58
E1	2.76	2.70	2.88	2.97	2.91	2.98	2.73	2.93	2.98	0.20	0.25
E2	2.78	2.71	2.80	2.63	2.88	2.69	2.74	2.77	2.69	0.03	-0.05
Grand Means	2.77	2.70	2.84	2.80	2.89	2.83	2.73	2.85	2.83	0.11	0.10

*Gains or Losses over Base

Table LXII

Experiment II: Means for Divergent Criteria Total Factors I, II, III for Treatment Groups over Time Line

	Weeks						O+A	B+C+D	E	Treatment	Post
	O	A	B	C	D	E	Base	Treatment	Post	Gains*	Gains*
A1	2.74	2.76	2.86	2.74	2.51	2.92	2.77	2.62	2.92	-0.15	0.16
A2	2.59	2.49	2.73	2.85	2.74	2.88	2.56	2.79	2.88	0.21	0.32
B1	2.51	2.53	2.89	2.72	2.57	2.97	2.54	2.67	2.97	0.11	0.43
B2	2.82	2.72	2.70	2.87	2.68	2.83	2.78	2.74	2.83	-0.05	0.06
C1	2.01	1.81	2.42	2.65	2.39	2.39	1.93	2.43	2.39	0.48	0.48
C2	3.32	3.44	3.17	2.94	2.86	3.40	3.39	2.99	3.40	-0.42	0.01
D1	2.70	2.55	1.84	1.64	1.46	2.05	2.65	1.64	2.05	-1.01	-0.59
D2	2.63	2.70	3.74	3.95	3.79	3.74	2.68	3.78	3.74	1.08	1.07
E1	2.49	2.57	2.71	2.63	2.61	2.68	2.54	2.58	2.68	0.03	0.14
E2	2.84	2.68	2.88	2.96	2.64	3.12	2.79	2.84	3.12	0.04	0.34
Grand Means	2.67	2.64	2.79	2.79	2.62	2.90	2.66	2.71	2.90	0.03	0.24

*Gains or Losses over Base

Table LXIII

Experiment II: Means for Aesthetic Quality Judgment
for Treatment Groups over Time Line

	Weeks						O+A	B+C+D	E	Treatment	Post
	O	A	B	C	D	E	Base	Treatment	Post	Gains*	Gains*
A1	2.49	2.61	2.68	2.53	2.58	2.68	2.61	2.60	2.68	-0.06	0.08
A2	2.78	2.69	2.89	2.96	2.70	3.10	2.74	2.85	3.10	0.11	0.36
B1	3.12	3.42	3.37	3.30	3.16	3.59	3.32	3.28	3.59	-0.04	0.28
B2	2.16	1.88	2.20	2.19	2.13	2.19	2.03	2.18	2.19	0.15	0.16
C1	2.57	2.59	2.64	2.73	2.51	2.69	2.58	2.63	2.69	0.05	0.11
C2	2.71	2.71	2.93	2.77	2.77	3.09	2.76	2.82	3.09	0.06	0.33
D1	2.83	2.79	2.81	2.71	2.58	2.95	2.81	2.70	2.95	-0.11	0.14
D2	2.44	2.51	2.76	2.78	2.70	2.83	2.53	2.75	2.83	0.22	0.30
E1	2.48	2.72	2.78	2.51	2.47	2.72	2.65	2.59	2.72	-0.06	0.07
E2	2.79	2.58	2.79	2.98	2.81	3.06	2.69	2.86	3.06	0.17	0.37
Grand Means	2.64	2.65	2.78	2.75	2.64	2.89	2.67	2.73	2.89	0.05	0.22

*Gains or Losses over Base

Table LXIV

Experiment II: Means for Spontaneous Criteria
Factor I for Treatment Groups over Time Line

	Weeks						O+A	B+C+D	E	Treatment	Post
	O	A	B	C	D	E	Base	Treatment	Post	Gains*	Gains*
A1	2.74	2.68	2.83	2.90	3.09	2.76	2.73	2.95	2.74	0.23	0.01
A2	2.91	2.95	2.99	2.87	2.88	2.83	2.93	2.93	2.83	0.00	-0.10
B1	3.03	3.15	3.16	3.02	3.09	2.88	3.11	3.10	2.86	-0.01	-0.25
B2	2.61	2.48	2.66	2.75	2.88	2.71	2.55	2.78	2.71	0.23	0.16
C1	3.29	3.33	3.19	2.96	3.11	2.83	3.29	3.09	2.81	-0.20	-0.49
C2	2.36	2.31	2.63	2.81	2.86	2.76	2.36	2.78	2.76	0.42	0.40
D1	2.99	2.77	3.69	3.96	4.06	3.60	2.88	3.93	3.58	1.05	0.71
D2	2.66	2.86	2.14	1.81	1.91	1.99	2.78	1.95	1.99	-0.83	-0.79
E1	2.83	2.78	2.90	3.06	2.98	3.01	2.79	3.00	3.01	0.21	0.22
E2	2.82	2.85	2.93	2.71	2.99	2.58	2.86	2.88	2.55	0.01	-0.31
Grand Means	2.82	2.82	2.91	2.88	2.98	2.79	2.83	2.94	2.78	0.11	-0.04

*Gains or Losses over Base

Table LXV

Experiment II: Means for Spontaneous Criteria
Factor II for Treatment Groups over Time Line

	Weeks						O+A	B+C+D	E	Treatment	Post
	O	A	B	C	D	E	Base	Treatment	Post	Gains*	Gains*
A1	2.81	2.63	2.73	2.78	2.91	2.71	2.72	2.82	2.71	0.10	-0.01
A2	3.02	2.78	2.93	2.71	2.73	2.98	2.89	2.76	2.98	-0.14	0.09
B1	3.11	2.99	2.97	2.84	2.84	2.83	3.04	2.87	2.83	-0.18	-0.21
B2	2.72	2.42	2.69	2.65	2.79	2.86	2.57	2.71	2.86	0.14	0.29
C1	3.26	3.23	3.03	2.80	2.89	3.11	3.24	2.90	3.11	-0.34	-0.14
C2	2.56	2.18	2.63	2.69	2.74	2.58	2.37	2.68	2.58	0.31	0.21
D1	3.01	2.74	3.53	3.70	3.96	3.58	2.87	3.73	3.58	0.86	0.71
D2	2.82	2.68	2.13	1.79	1.68	2.11	2.74	1.84	2.11	-0.90	-0.63
E1	2.85	2.73	2.89	2.93	2.83	2.96	2.79	2.85	2.96	0.06	0.17
E2	2.98	2.69	2.76	2.56	2.81	2.73	2.83	2.73	2.73	-0.10	-0.09
Grand Means	2.91	2.71	2.83	2.74	2.82	2.84	2.81	2.79	2.84	-0.02	0.04

*Gains or Losses over Base

Table LXVI

Experiment II: Means for Spontaneous Criteria Factor III for Treatment Groups over Time Line

	Weeks						O+A	B+C+D	E	Treatment	Post
	O	A	B	C	D	E	Base	Treatment	Post	Gains*	Gains*
A1	2.42	2.51	2.69	2.71	2.82	2.76	2.48	2.74	2.76	0.27	0.29
A2	2.74	2.79	3.02	2.88	2.94	3.00	2.76	2.96	3.00	0.20	0.24
B1	2.84	3.07	3.12	2.91	3.08	2.97	2.95	3.05	2.97	0.10	0.02
B2	2.32	2.23	2.59	2.68	2.69	2.79	2.29	2.66	2.79	0.37	0.51
C1	3.07	3.04	3.11	2.96	2.94	2.94	3.06	3.02	2.94	-0.04	-0.12
C2	2.09	2.27	2.61	2.63	2.82	2.83	2.18	2.69	2.83	0.51	0.64
D1	2.75	2.84	3.82	3.76	3.91	3.72	2.81	3.84	3.72	1.03	0.91
D2	2.41	2.46	1.90	1.83	1.85	2.04	2.43	1.87	2.04	-0.56	-0.39
E1	2.61	2.71	3.01	2.94	2.94	2.98	2.66	2.96	2.97	0.31	0.32
E2	2.54	2.59	2.71	2.65	2.82	2.79	2.58	2.74	2.79	0.16	0.21
Grand Means	2.58	2.65	2.86	2.79	2.88	2.88	2.62	2.85	2.88	0.23	0.26

*Gains or Losses over Base

Table LXVII

Experiment II: Means for Divergent Criteria
Factor I for Treatment Groups over Time Line

	Weeks						O+A	B+C+D	E	Treatment	Post
	O	A	B	C	D	E	Base	Treatment	Post	Gains*	Gains*
A1	2.79	2.81	2.86	2.53	2.42	2.90	2.80	2.60	2.90	-0.20	0.09
A2	2.58	2.62	2.55	2.88	2.69	2.74	2.61	2.71	2.74	0.10	0.13
B1	2.49	2.54	2.78	2.65	2.59	2.91	2.53	2.68	2.92	0.15	0.39
B2	2.88	2.89	2.63	2.75	2.52	2.73	2.88	2.63	2.72	-0.25	-0.18
C1	2.01	2.04	2.33	2.47	2.27	2.53	2.05	2.36	2.53	0.31	0.47
C2	3.31	3.39	3.09	2.93	2.84	3.11	3.36	2.95	3.11	-0.41	-0.25
D1	2.65	2.60	1.55	1.47	1.13	1.81	2.62	1.38	1.81	-1.24	-0.81
D2	2.72	2.83	3.86	3.93	3.98	3.83	2.79	3.93	3.83	1.14	1.03
E1	2.50	2.62	2.61	2.43	2.49	2.66	2.57	2.51	2.66	-0.06	0.09
E2	2.87	2.81	2.80	2.98	2.62	2.98	2.84	2.79	2.98	-0.04	0.13
Grand Means	2.68	2.72	2.71	2.70	2.55	2.82	2.71	2.65	2.82	-0.05	0.11

*Gains or Losses over Base

Table LXVIII

Experiment II: Means for Divergent Criteria
Factor II for Treatment Groups over Time Line

	Weeks										
	O	A	B	C	D	E	O+A Base	B+C+D Treatment	E Post	Treatment Gains*	Post Gains*
A1	2.54	2.63	2.87	2.70	2.38	2.83	2.59	2.64	2.83	0.05	0.23
A2	2.42	2.09	2.73	2.61	2.57	2.93	2.26	2.64	2.93	0.38	0.68
B1	2.41	2.45	2.98	2.66	2.46	2.90	2.43	2.69	2.90	0.26	0.47
B2	2.55	2.27	2.62	2.65	2.49	2.86	2.42	2.59	2.86	0.17	0.44
C1	1.86	1.56	2.39	2.61	2.30	2.18	1.71	2.44	2.18	0.73	0.47
C2	3.09	3.16	3.21	2.70	2.64	3.58	3.14	2.84	3.58	-0.29	0.44
D1	2.66	2.31	1.86	1.63	1.61	2.18	2.50	1.69	2.18	-0.81	-0.33
D2	2.30	2.41	3.74	3.68	3.34	3.58	2.35	3.59	3.58	1.24	1.23
E1	2.30	2.36	2.75	2.59	2.48	2.64	2.34	2.61	2.64	0.26	0.29
E2	2.66	2.35	2.84	2.72	2.46	3.12	2.51	2.68	3.12	0.17	0.61
Grand Means	2.48	2.36	2.80	2.66	2.47	2.88	2.43	2.64	2.88	0.22	0.45

*Gains or Losses over Base

Table LXIX

Experiment II: Means for Divergent Criteria
Factor III for Treatment Groups over Time Line

	Weeks						O+A	B+C+D	E	Treatment	Post
	O	A	B	C	D	E	Base	Treatment	Post	Gains*	Gains*
A1	2.89	2.94	2.86	2.96	2.72	3.04	2.91	2.96	3.04	0.05	0.13
A2	2.72	2.79	2.91	3.05	2.95	2.96	2.75	2.98	2.98	0.23	0.21
B1	2.64	2.73	2.91	2.82	2.69	3.11	2.68	2.93	3.12	0.26	0.43
B2	2.96	3.00	2.86	3.19	2.98	2.90	2.99	3.01	2.90	0.02	-0.09
C1	2.09	1.98	2.58	2.86	2.59	2.48	2.03	2.80	2.49	0.78	0.45
C2	3.52	3.76	3.19	3.15	3.08	3.53	3.64	3.14	3.53	-0.50	-0.11
D1	2.75	2.88	2.13	1.80	1.61	2.15	2.81	1.97	2.16	-0.84	-0.67
D2	2.86	2.86	3.64	4.21	4.06	3.86	2.85	3.97	3.87	1.12	1.01
E1	2.65	2.82	2.77	2.86	2.83	2.73	2.73	2.95	2.73	0.23	0.00
E2	2.96	2.91	3.00	3.15	2.84	3.28	2.94	2.99	3.29	0.05	0.34
Grand Means	2.80	2.87	2.88	3.00	2.83	3.00	2.83	2.97	3.01	0.14	0.17

*Gains or Losses over Base

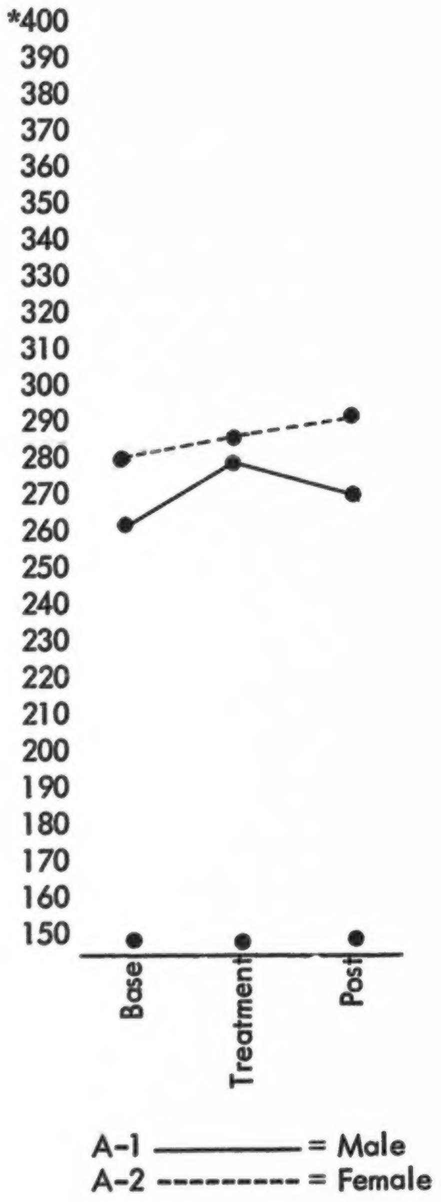


Figure 53: Experiment II: Spontaneous Criteria
Total by Experimental Periods

Factor A

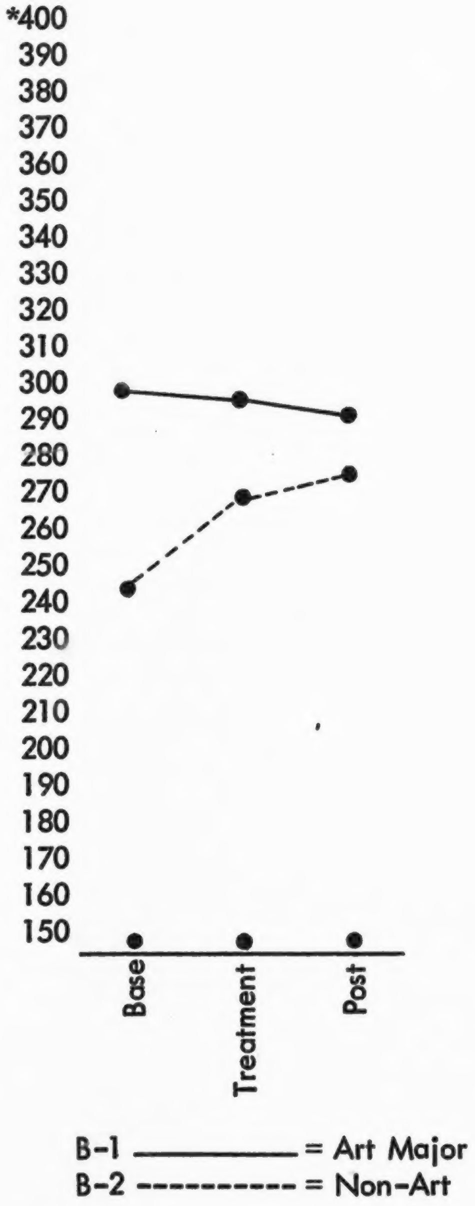
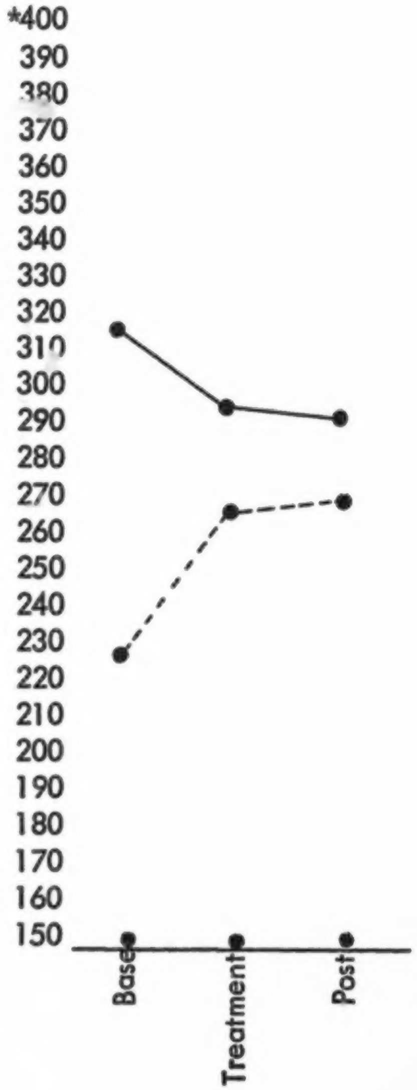


Figure 54: Experiment II: Spontaneous Criteria
Total by Experimental Periods

Factor B

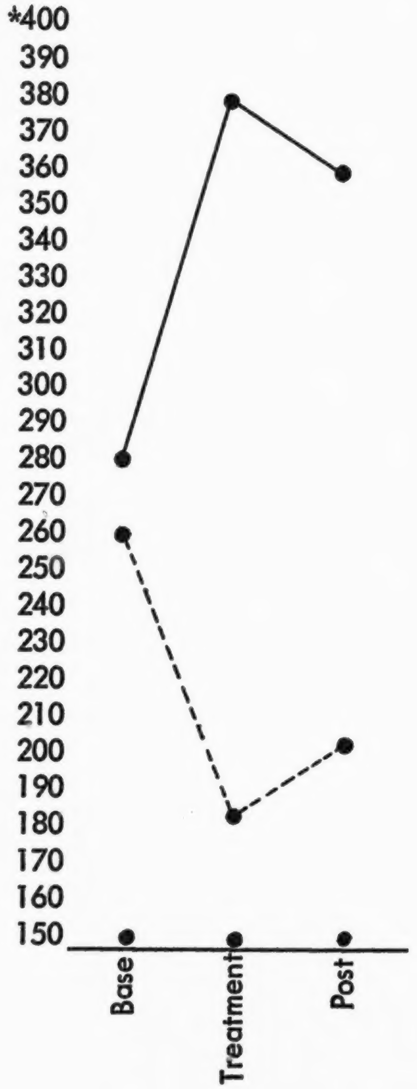
*Means (decimal omitted) on a scale on which 500 = high, 250 = average, 100 = low.



C-1 ———————— = Spontaneous Classification
C-2 ----------------- = Divergent Classification

Figure 55: Experiment II: Spontaneous Criteria
Total by Experimental Periods

Factor C



D-1 ———————— = Spontaneous Style Instruction
D-2 ----------------- = Divergent Style Instruction

Figure 56: Experiment II: Spontaneous Criteria
Total by Experimental Periods

Factor D

*Means (decimal omitted) on a scale on which 500 = high, 250 = average, 100 = low.

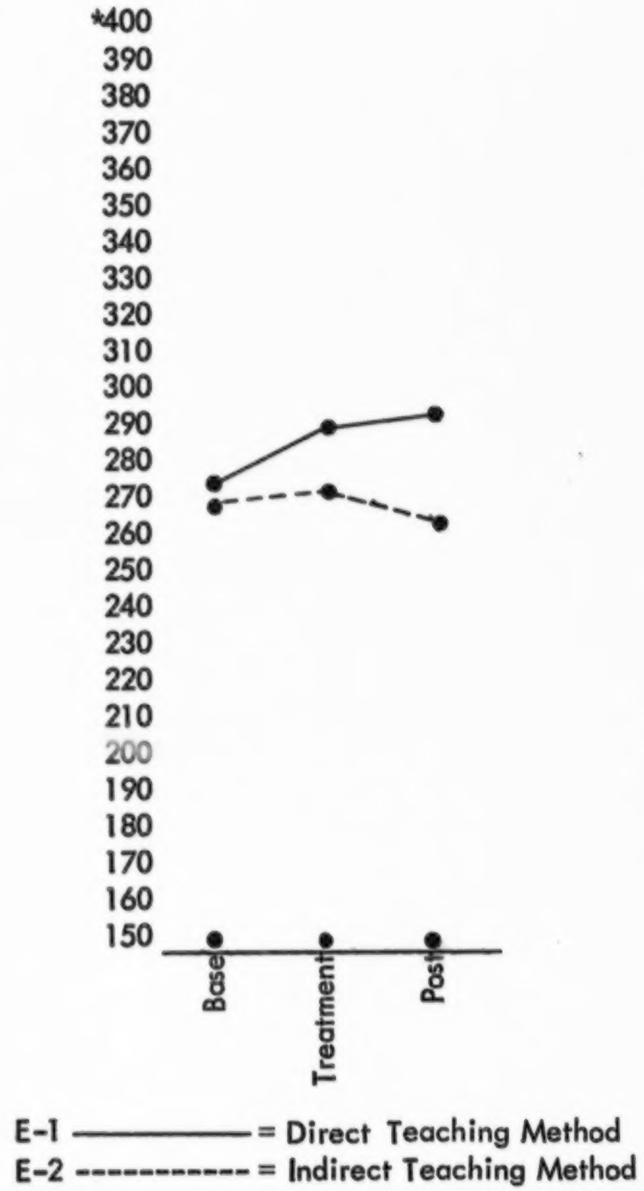


Figure 57: Experiment II: Spontaneous Criteria
Total by Experimental Periods

Factor E

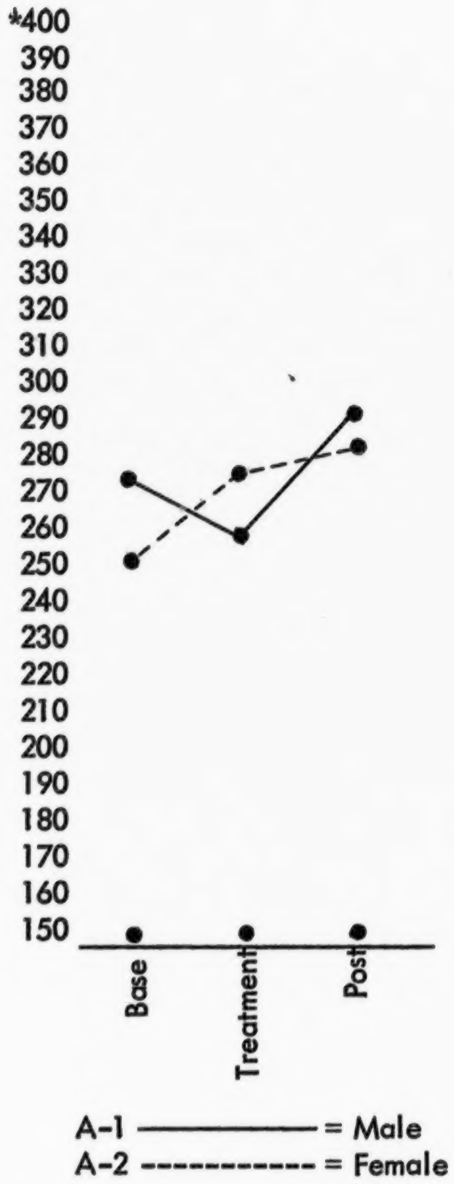
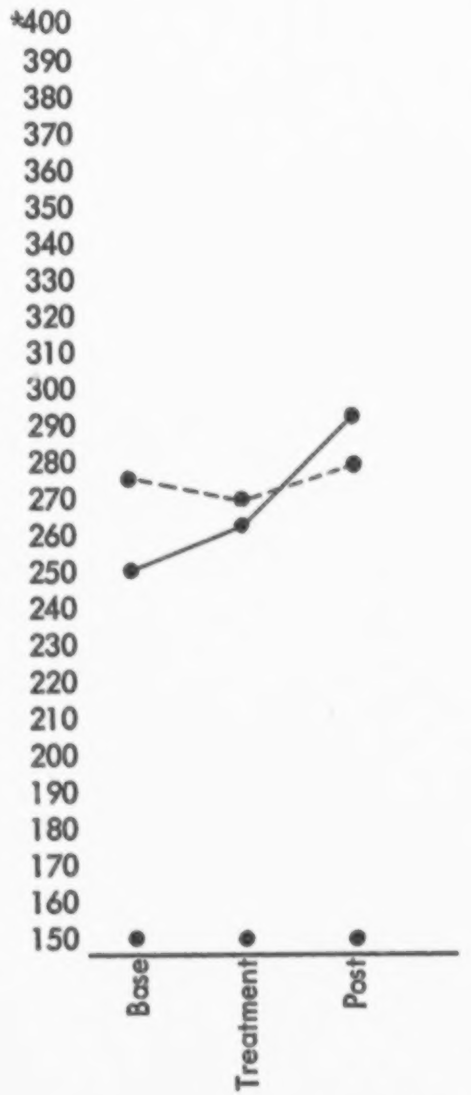


Figure 58: Experiment II: Divergent Criteria
Total by Experimental Periods

Factor A

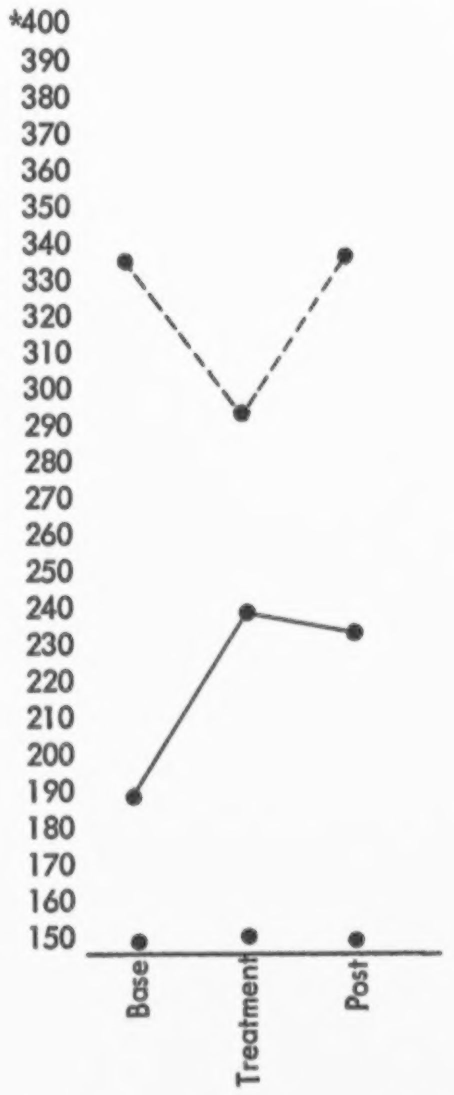
*Means (decimal omitted) on a scale on which 500 = high, 250 = average, 100 = low.



B-1 ———————— = Art Major
B-2 ------------ = Non-Art

Figure 59: Experimental II: Divergent Criteria Total by Experimental Periods

Factor B

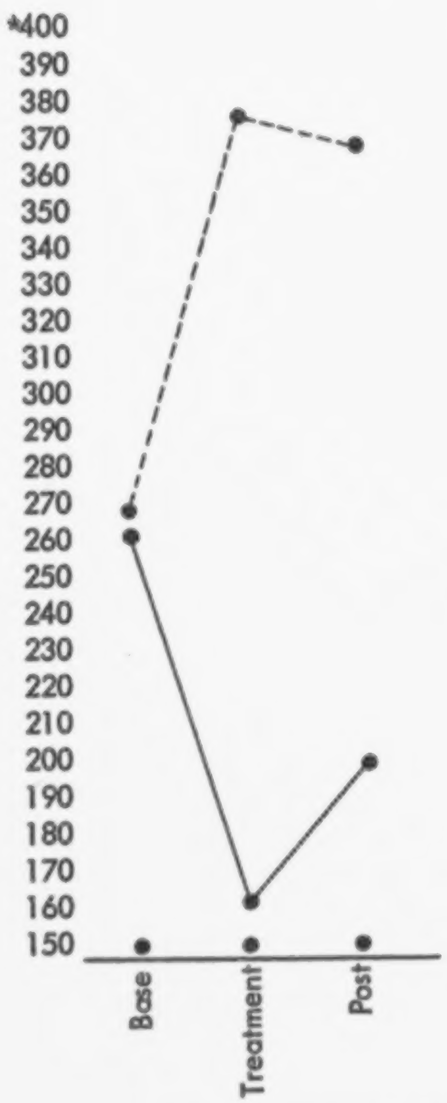


C- 1 = ———————— = Spontaneous Classification
C- 2 = ------------ = Divergent Classification

Figure 60: Experiment II: Divergent Criteria Total by Experimental Periods

Factor C

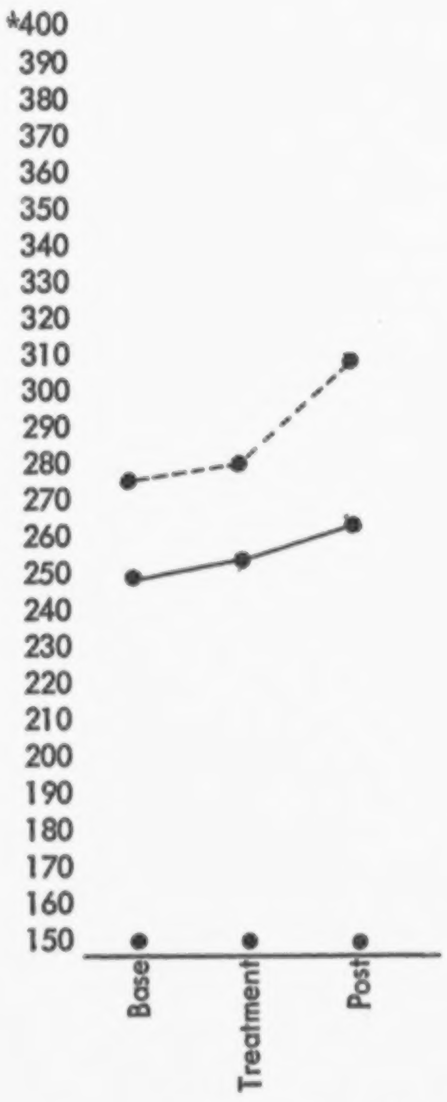
*Means (decimal omitted) on a scale on which 500 = high, 250 = average, 100 = low.



D-1 ———— = Spontaneous Style Instruction
D-2 ----------- = Divergent Style Instruction

Figure 61: Experiment II: Divergent Criteria
Total by Experimental Periods

Factor D



E-1 ———— = Direct Teaching Method
E-2 ----------- = Indirect Teaching Method

Figure 62: Experiment II: Divergent Criteria
Total by Experimental Periods

Factor E

*Means (decimal omitted) on a scale on which 500 = high, 250 = average, 100 = low.

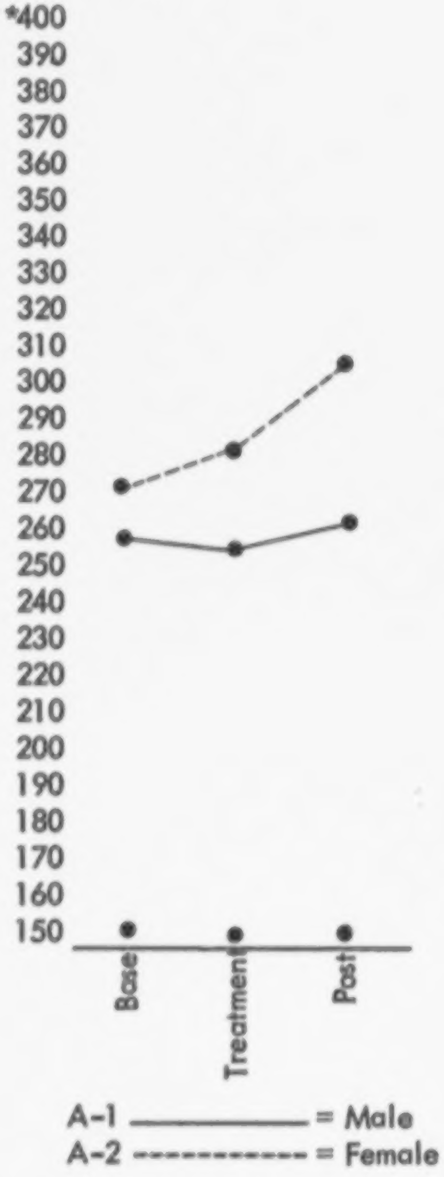


Figure 63: Experiment II: Aesthetic Quality Judgments by Experimental Periods

Factor A

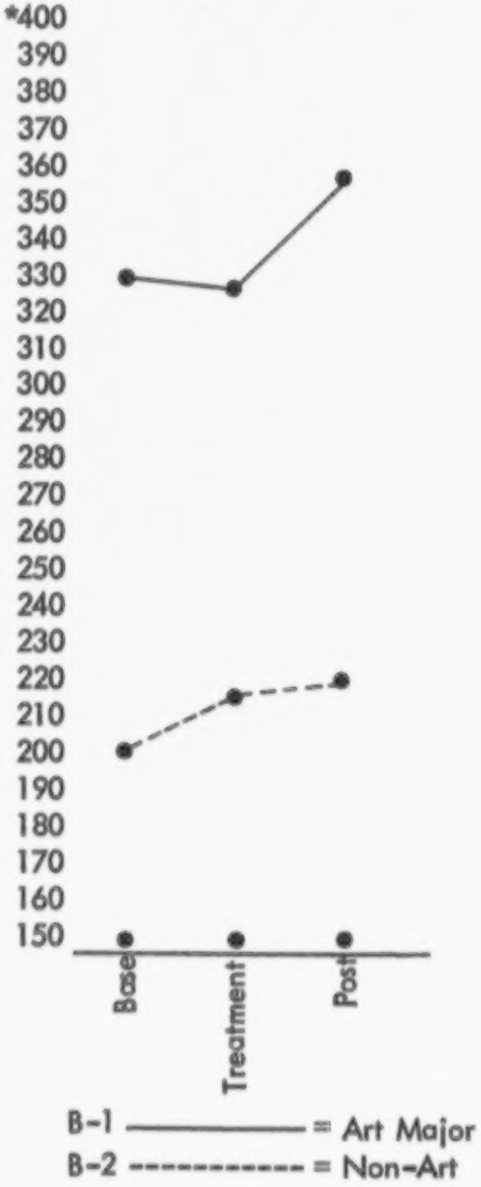
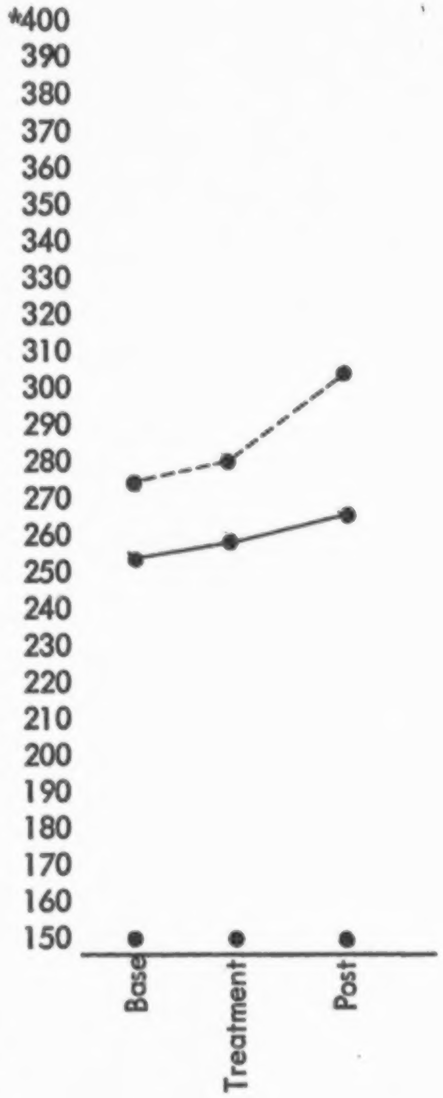


Figure 64: Experiment II: Aesthetic Quality Judgments by Experimental Periods

Factor B

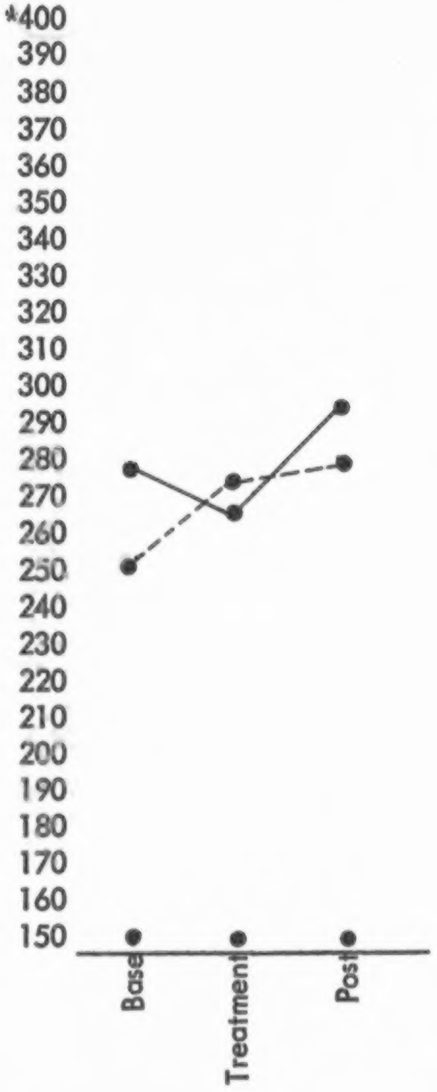
*Means (decimal omitted) on a scale on which 500 = high, 250 = average, 100 = low.



C-1 ——————— = Spontaneous Classification
C-2 ----------- = Divergent Classification

Figure 65: Experiment II: Aesthetic Quality Judgments by Experimental Periods

Factor C



D-1 ——————— = Spontaneous Style Instruction
D-2 ----------- = Divergent Style Instruction

Figure 66: Experiment II: Aesthetic Quality Judgments by Experimental Periods

Factor D

*Means (decimal omitted) on a scale on which 500 = high, 250 - average, 100 = low.

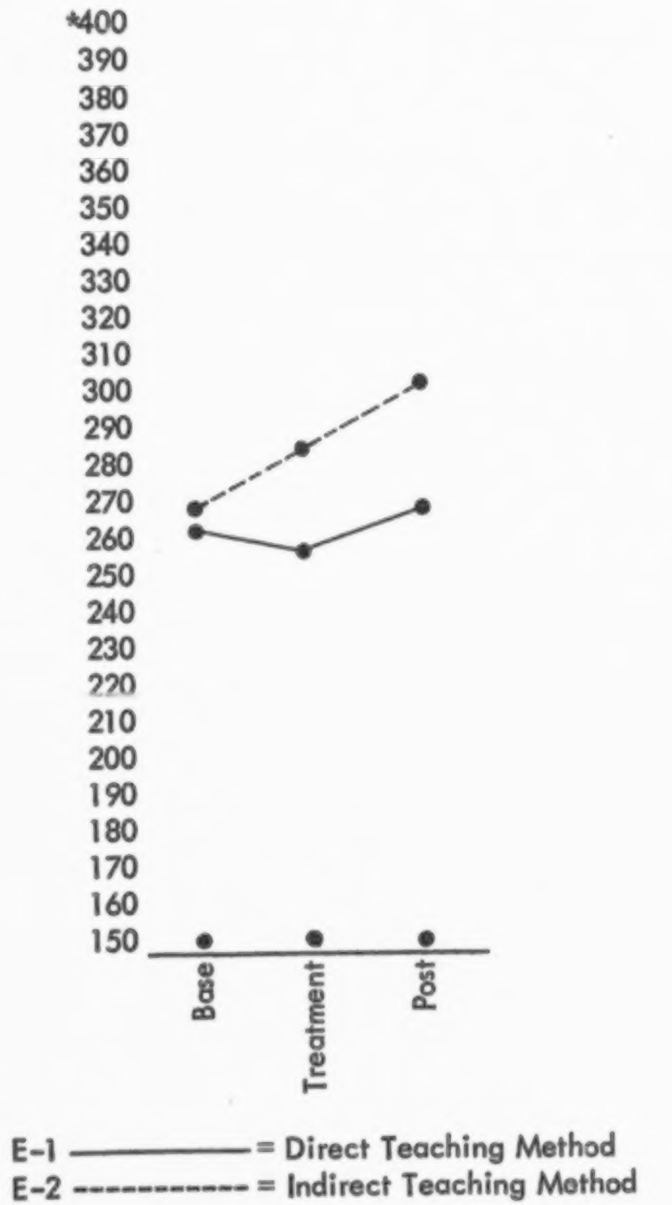


Figure 67: Experiment II: Aesthetic Quality Judgments by Experimental Periods

Factor E

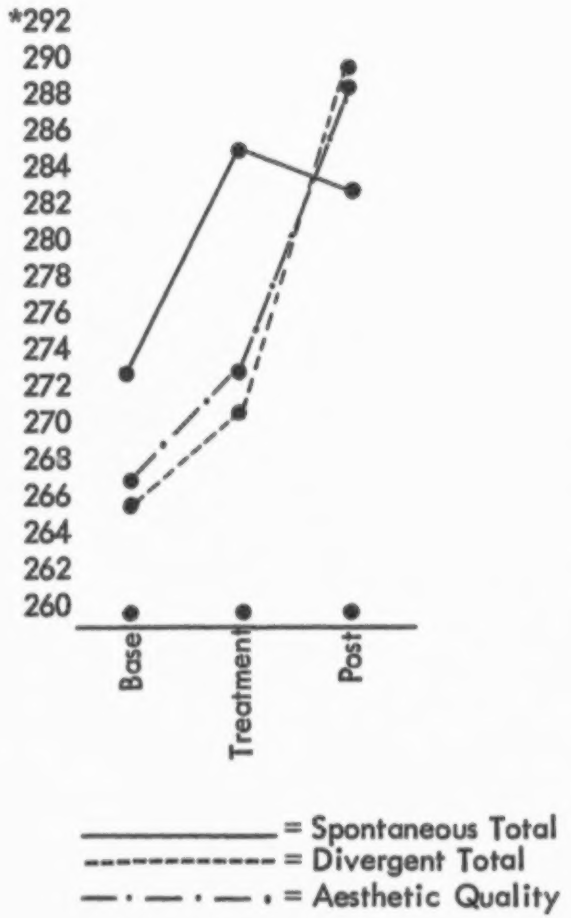


Figure 68: Experiment II: Spontaneous Total, Divergent Total, and Aesthetic Quality Judgment (the three main dependent variables) by Experimental Periods

*Means (decimal omitted) on a scale on which 500 = high, 250 = average, 100 = low.

Table LXX

Experiment II: Intercorrelation of Six Strategy Criteria Factors and Aesthetic Quality

	S1	S2	S3	D1	D2	D3	AQ	ST
S2	.907							
S3	.857	.796						
D1	-.838	-.838	-.760					
D2	-.649	-.669	-.539	.785				
D3	-.823	-.823	-.723	.902	.848			
AQ	.161	.180	.211	.101	.212	.044		
ST	.939	.901	.887	-.852	-.640	-.832	.194	
DT	-.057	.008	-.048	.062	.010	.056	-.041	-.291

Identification of Variables

S1, S2, S3 - Spontaneous Criteria Factor Clusters 1, 2, and 3

D1, D2, D3 - Divergent Criteria Factor Clusters 1, 2 and 3

AQ - Aesthetic Quality Judgment
ST - Spontaneous Criteria Factors Total
DT - Divergent Criteria Factors Total

Table LXXI

Experiment II: Intercorrelations of Spontaneity Total, Divergency Total, and Aesthetic Quality with Art Experience Index
N=32

	1	2	3	4	5	6	7	8	9
2	0.424								
3	0.294	0.839							
4	-0.834	-0.245	-0.205						
5	-0.320	-0.913	-0.780	0.258					
6	-0.391	-0.780	-0.813	0.450	0.847				
7	0.369	0.228	0.271	-0.044	-0.037	-0.006			
8	0.457	0.129	0.002	-0.136	0.124	0.111	0.694		
9	0.289	0.178	0.153	0.069	0.073	0.099	0.833	0.810	
10	0.319	0.121	0.050	-0.046	0.061	0.078	0.769	0.733	0.801

Variable Identification

1. Spontaneity Total, Base
2. Spontaneity Total, Treatment
3. Spontaneity Total, Post
4. Divergency Total, Base
5. Divergency Total, Treatment
6. Divergency Total, Post
7. Aesthetic Quality, Base
8. Aesthetic Quality, Treatment
9. Aesthetic Quality, Post
10. Art Experience Index (Burgart's)

Table LXXII

Experiment II: Means for Drawing Time[1] in Relation to Experimental Factors

Factor and Level	Base	Treatment	Post	Treatment Gains	Post Gains
A-1	21.60	19.80	20.29	-1.80	-1.31
A-2	21.26	21.69	17.61	.43	-3.65
B-1	19.21	19.79	17.16	.58	-2.05
B-2	23.66	21.69	20.74	-1.97	-2.92
C-1	21.14	17.46*	17.14	-3.68	-4.00
C-2	21.72	24.03	20.77	2.31	- .95
D-1	21.89	19.09	16.68	-2.80	-5.21**
D-2	20.97	22.40	21.23	1.43	.74
E-1	19.56	19.37	18.04	- .19	-1.52
E-2	23.31	22.12	19.86	-1.19	-3.45
Grand Mean	21.43	20.74	18.95	- .69	-2.48

*Difference between C-1 and C-2 significant at .05 level
**Difference between D-1 and D-2 just short of .05 level

---

[1] Since a standard time interval was used for in-process photographs, number of photographs was taken as the drawing time score.

Table LXXIII

Experiment II: Relationship between
Strategy Classification and Strategy Instruction
on Drawing Time[1] (CxD Interaction)

Factor and Level	Base	Treatment	Post	Treatment Gains	Post Gains
C1-D1	22.13	14.09	15.44	-8.04	-6.69
C1-D2	20.16	20.83	18.84	.67	-1.32
C2-D1	21.66	24.09	17.91	2.33	-3.75
C2-D2	21.77	23.98	23.63	2.21	1.86
Range Interval	1.97	10.00	8.19	10.37	8.55

Note: None of the above interactions are significant.

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[1] As measured by number of process photographs (a standard time interval used for in-process photographs).

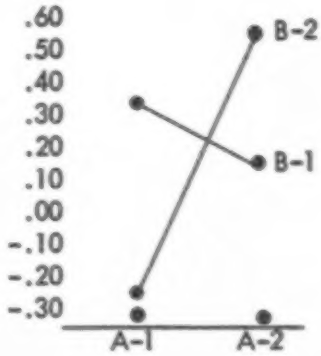

Figure 69: Experiment II: Interaction of Factors A and B on Gains on Aesthetic Quality at Post Period

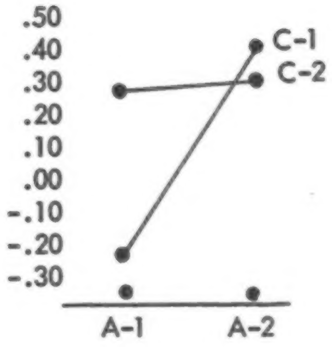

Figure 70: Experiment II: Interaction of Factors A and C on Gains on Aesthetic Quality at Post Period

Appendix C: Self-Rating Forms Used in Experiment I

Self-Rating Schedule for Perceived Strategy Used at Beginning of G Week in Experiment I

Think of the drawings you have done this Term and try to describe them through the following items. Note that there are no correct answers, since the questions all have to do with styles which are considered qualitatively equal. An immediate reaction without much pondering is desired.

	Yes	No	?
1 My concern is largely linear.			
2. There is much action in my drawings (I use quick motions, and objects appear to have gesture).			
3. I wash in or black in, in general terms, before working out details.			
4 Typically, I begin a picture off center, working on a part, and detail appears early.			
5. My concern is largely painterly.			
6 I often focus on a single element or object for subject matter.			
7 I like to follow up a theme from one drawing to another, progressively eliminating non-essentials.			
8. I usually begin with a big central statement without details.			
9. I often make a quick line or brush stroke right across forms or contours.			
10. I am the opposite of a "hard-edge" painter.			
11. I use a great variety and mingling of strokes.			
12 I often add the black or patterns toward the end of a drawing in a kind of "fill-in" operation.			
13 I like to take the same element, theme, or form and vary it in a drawing.			
14 Size changes in scale (reversals of expected size relationships) occur frequently in my drawings.			
15. Details are suggested and not "pinned down" upon close inspection of them.			
16 Decorative patterns crop up in my work.			
17. One stroke is laid over another. There are rough edges to forms, and broken lights left in dark areas.			
18 I like to play with black-white negative reversals.			
19 My pictures give the impression of flatness (with solid black-white contrasts and little or no movement within shapes).			

	Yes	No	?
20. Objects are often fused or lumped together into an organic unit.			
21. Contours are often left open, broken or unfinished intentionally.			
22. My work seems to develop progressively or organically (like a picture in the developer, it is "all there" vaguely from the start).			
23 I sometimes draw still or static forms as though they are suspended or floating.			
24. Movement appears within the shapes I draw (my pen or brush is "restless").			
25 I often begin with a single object.			
26 My work is "hard-edge" and my hand is more "restrained."			

Rate your drawings on the following bi-polar scales (a check in the middle means can't tell, 50-50, or irrelevant; try, however, to swing your reaction to one or the other side as often as possible). (Place an X on the line, not on the colon.)

1. contained ________: ________: ________: restless
2. elegance ________: ________: ________: presence
3. weak ________: ________: ________: strong
4. active ________: ________: ________: passive
5. autobiographical ________: ________: ________: depersonalized
6. hard-edge ________: ________: ________: abstract-expressionist
7. calm ________: ________: ________: excitable
8. hard ________: ________: ________: soft
9. slow ________: ________: ________: fast
10. masculine ________: ________: ________: feminine
11. loose ________: ________: ________: controlled
12. isolation ________: ________: ________: interaction

Check also the following, using the same system.

1. Line quality: linear ________: ________: ________: painterly
2. Space: recession ________: ________: ________: plane
3. Composition: closed ________: ________: ________: open
4. Elaboration: unity ________: ________: ________: multiplicity
5. Light: clearness ________: ________: ________: unclearness

Finally, check the pictorial examples and rate yourself according to them as:

Spontaneous: High ___: ___: ___: ___: ___: ___: Low

Divergent: High ___: ___: ___: ___: ___: ___: Low

Example of Self-Evaluation of Drawings Form for Experiment I

LAST NAME______________________DATE______________PICTURE #__________

Mentally divide your process shots into 3 to 6 STAGES and indicate your groupings as indicated below. There is no expected terminology or order for stages. The purpose of this exercise is to focus your attention on the drawing series before you and to help us understand how you see it.

Put as many or as few photos in a stage as you like. Then describe briefly in your own words these stages in terms of what you did and what you feel you were after. Try to use this form:

Operation. (Specify what you did and how you did it.)

Purpose. (Specify what you think you were trying to achieve in this stage. This does not imply that you should have been conscious of your purpose at the time you did it nor even that you should be certain now.)

STAGE I. OPERATION (Photo #_____ to _____)

PURPOSE

STAGE II. OPERATION (Photo #_____ to _____)

PURPOSE

(Space for six stages was provided.)

At what STAGE was the OVERALL EFFECT of your FINAL DRAWING clear to you?

Stage: I II III IV V VI (Circle the appropriate stage number)

Could the order of the stages of this drawing be changed? YES____ NO____ WHY or WHY or WHY NOT?

You will be working under much the same conditions immediately following this self-evaluation. In what way might you intensify and/or modify the way you work and what you are working for?

(Space for response was supplied.)

Are there any other ideas, insights, or comments that come to you on your drawing?

(Space for response was supplied.)

Descriptive Checklist

If you feel that the picture you have just evaluated is very closely related to one or other end of each of the scales below, place your check mark at the appropriate end. If the relationship is slighter, indicate this by moving a degree or two toward the center space. The center space means neutral on the scale, both sides of the scale being equally associated or, perhaps, completely irrelevant.

Make each item a separate and independent judgment. Work at a fairly high speed and do not worry or puzzle over an item. Your first impression, the immediate "feeling" is wanted. On the other hand, please do not be careless, because we want your true impressions. There is no "right" or "expected" answer.

This Not This

Put your check in the space: ______ : __X__ : ______X______

1. HARD ____:____:____:____:____:____:____ SOFT

2. IMPORTANT ____:____:____:____:____:____:____ UNIMPORTANT

3. SLOW ____:____:____:____:____:____:____ FAST

4. MASCULINE ____:____:____:____:____:____:____ FEMININE

5. USUAL ____:____:____:____:____:____:____ UNUSUAL

6. UNSUCCESSFUL ____:____:____:____:____:____:____ SUCCESSFUL

7. ACTIVE ____:____:____:____:____:____:____ PASSIVE

8. COLORFUL ____:____:____:____:____:____:____ COLORLESS

9. UNLIKELY ____:____:____:____:____:____:____ LIKELY

10. GOOD ____:____:____:____:____:____:____ BAD

11. WEAK ____:____:____:____:____:____:____ STRONG

12. CALM ____:____:____:____:____:____:____ EXCITABLE

Appendix D: Summary of Galvanic Skin Response Measurements and Their Relationship to Drawing Strategies in Experiment II

THE GALVANIC SKIN RESPONSE AND ITS RELATIONSHIPS TO STRATEGY IN THE DRAWING PROCESS

by James J. Johnson, Jr.
Graduate Research Assistant

I. Introduction and Background

The basic concept for this research originated with the realization that the drawing process has previously been considered, by researchers in art education, primarily from the products or drawings of individuals involved in the drawing process (1). The study of the drawing process can be effectively expanded by considering not only his drawings, but the individual himself through the measurement of the physiological changes which occur within the individual during the drawing process.

The measurement of the physiological changes which occur within the individual is a means of looking at behavior from the inside out. "Chemical changes in the blood stream furnish more energy to the neural centers as well as to the muscles, and, at the same time, these centers are subjected to an increasing barrage of return impulses from viscera and from skeletal musculature, which in turn increase the activity of the centers, leading to more activity, in an ascending spiral of activity and reactivity. Fortunately, there are self-limiting mechanisms, parasympathetic, which check this build-up so we do not always and in a state of violent emotion." (2)

The consideration of the drawing process from a physiological base is a possible means of clarifying many problems. As Pribram states, "The behavioral sciences have been primarily concerned with externally placed guides on behavior." (3) Pribram believes that the reinforcing process basic to education has an intrinsic organic and neurological structure which respects the intrinsic structure of the materials to be taught (4).

II. Need and Objectives

No comprehensive relationship between the covert behavior (activation) and the overt behavior (activity of the drawing process) has been made to date. By measuring the levels of activation (in this specific case, GSR), elements will be revealed relating activation to the drawing process. Response patterns specific to emotional states and various specific tasks were found by Ax (5), Wenger (6) and Davis (7). This supports the possibility of response specificity existing during the drawing process, a principal objective.

III. Statement of the Problem

The purpose of this research was to determine whether or not there are patterns of physiological activation (indicative of activity in the autonomic nervous system as measured by the galvanic skin response, GSR) which are specific to spontaneous and divergent drawing strategies respectively.

IV. Formal Hypothesis

Galvanic skin response patterns which are specific to spontaneous and divergent drawing strategies are as follows:

1. The galvanic skin response for the spontaneous drawing strategy, (S), will be:
   a. Greater response frequency, (F), than divergent;
   b. Less response amplitude, (A), than divergent

2. The galvanic skin response for the divergent drawing strategy, (D), will be:
   a. Less response frequency, (F), than spontaneous;
   b. Greater response amplitude, (A), than spontaneous

F: $S > D$
A: $S < D$

V. Definition of Terms

Activation

Activation is defined as internal arousal, energy mobilization, or excitation. It can also be defined as the extent of release of energy existent in an electrical, chemical or thermal state within the organism. Activation is measurable and predictable in controlled situations and can be used as an indication of activity in the "central nervous system"(8). Activation has also been considered a means of studying "emotional states." Cannon believed it to be what he called "flight or fight" reactions (9). Later researchers such as Albert Ax have also considered activation from the standpoint of emotion. This is evidenced by Ax's studies concerning "fear and anger" (10).

Galvanic Skin Response

The galvanic skin response, GSR, a specific measure of activation, is the increase in skin conductance or the decrease of its reciprocal, skin resistance, because of chemical-electrical reactions due to changes in external and interanl stimuli (11). The galvanic skin response in the context of this study is the descriptive measurement of the frequency and amplitude of GSR as recorded by the GSR unit, Dermograph.

Frequency

Frequency is the number of responses per minute and is obtained by dividing the total number of responses during the drawing by the number of minutes required to complete the drawing (12).

Amplitude

Amplitude is the average per cent change of responses during a drawing in relation to the various changes in base resistance of a subject during a drawing. Lacey helps to clarify why amplitude is best expressed as a per cent change in relation to base resistance "...methods which do not take the changing baselines of physiological measures into consideration may distort the accuracy of the numerical representation of the process (13)."

VI. Procedure

GSR measurements were obtained for each of the thirty-two male and females, art and non-art subjects while in the act of drawing with pen, brush and ink, during phase two of U.S.O.E. Project CRP 3149. The GSR portion of the experiment consisted of three exposures for each subject. Drawings were photographed to provide a visual record of the drawing process to which GSR data could be compared. The frequency and amplitude of physiologcial activation as measured by the GSR unit, Dermograph, and recorded on chart paper graphs, were analyzed in relation to (a) sex, (b) art training, (c) drawing strategy, (d) stylistic instruction and (e) teaching method (14).

VII. Results

A statistical analysis of the data revealed:

1. The means for spontaneous subjects were greater in both frequency and amplitude than divergent subjects (Table I).

2. High correlations exist among all three weeks for frequency, and relatively low correlations exist for amplitude (Table II).

3. Significant interactions exist between and among variables as indicated by analysis of variance (see statistical Table III for specific interactions).

VIII. Conclusions

On the basis of the data, Hypothesis I, that spontaneous will be greater than divergent in frequency, can be accepted. Hypothesis 2, divergent will be greater than spontaneous in amplitude, must be rejected. The high correlations which exist for frequency indicate that both S and D subjects are consistent in this respect. The strongest frequency trend is "stylistic instruction" which is present in interactions throughout the experiment. This suggests stylistic instruction as a factor to be scrutinized in future psychophysic-art behavior research. The fact that the number of responses per minute for S is, on the average, one response or 20% greater than D indicates that physiological patterns (as defined by this research) specific to strategy do exist.

The strongest amplitude trend is indicated by the effect of art training and strategy which suggests that these factors influence response intensity. The low week to week correlation of amplitude established that intensity is much more variable than frequency. On this basis, it is recommended that future psychophysic-art behavior studies employ a greater number of exposures in the measurement of response amplitude.

It is also recommended that future research in this area employ multiple measures of activation in addition to GSR such as respiration, heart rate, salivary output and pupilary responses. It can be concluded, on the basis of this experiment, that physiological factors occurring during the drawing process can be successfully determined.

SUMMARY OF STATISTICAL TABLES

Table I - Strategy Means (Totals)

	S	D
Frequency	6.33 resp./min.	5.33 resp./min.
Amplitude	1.74%	1.59%

Table II - Correlations

Frequency (correlations by weeks)

	1	2	3
2	r = .76		
3	r = .73	r = .59	

Amplitude (correlations by weeks)

	1	2	3
2	r = .13		
3	r = .23	r = .22	

Table III - Analysis of Variance
(Main Effects, Interactions and Significance)

Frequency

Week 1	Week 2	Week 3
Art training, stylistic instruction, teaching method (BDE) .05 level	Sex (A) .05 level Sex, strategy, stylistic, instruction (ACD) .10 level	Strategy, stylistic, instruction, teaching method (CDE) .05 level

Amplitude

Week 1	Week 2	Week 3
Art training (B) .10 level	No significance	Sex, art training (AB) .05 level
Art training , strategy (BC) .10 level		Art training, strategy (BC) .05 level
Teaching method (E) .05 level		Sex, strategy, stylistic instruction (ACD) .01 level

Bibliography

1. Beittel, Kenneth R. "Effect of Self-Reflective Training in Art on the Capacity for Creative Action." Cooperative Research Project No. 1874, The Pennsylvania State University, 1964 (Office of Education Final Report), p. 25.

2. Woodworth, Robert S., Schlosberg, Harold. *Experiment Psychology*. New York: Henry Holt and Co. 1954. p. 136.

3. Pribram, Karl H. "Neurological Note on the Art of Educating." *Theories of Learning and Instruction: NSSE Yearbook*. 1964. p. 79.

4. *Ibid*.

5. Ax, A. F. "The Physiological Differentiation Between Fear and Anger in Humans." *Psychom*. *Med*., *15*:433-442. 1953.

6. Wenger, M.A. "Studies of Autonomic Balance in Army Air Forces Personnel." *Comp. Psychol. Monogr*. Vol. 19, No. 4. Berkeley: University of California Press. 1948.

7. Davis, R. C. "Response Patterns." The New York Academy of Sciences, Section of Psychology Presentation. May 20, 1957.

8. Duffy, Elizabeth. *Activation and Behavior*. New York: John Wiley and Sons. 1962. p. 34.

9. Sternbach, Richard A. *Principles of Psychophysiology*. New York: Academic Press. 1966. p. 57.

10. Ax, *op*. *cit*.

11. Woodworth, *op*. *cit*.

12. Stern, Robert M. Personal Communication.

13. Sternbach, *op*. *cit*., p. 47.

14. Beittel, K. R. U.S.O.E. Project CRP 3149. "Phase Two."